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A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 162)

JANUARY 1977

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

STAR (N-10000 Series)	N76-32124—N76-34122
IAA (A-10000 Series)	A76-44717—A76-47926

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NASA SP-7011 (162)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 162)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1976 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 189 reports, articles and other documents announced during December 1976 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1976 Supplements.

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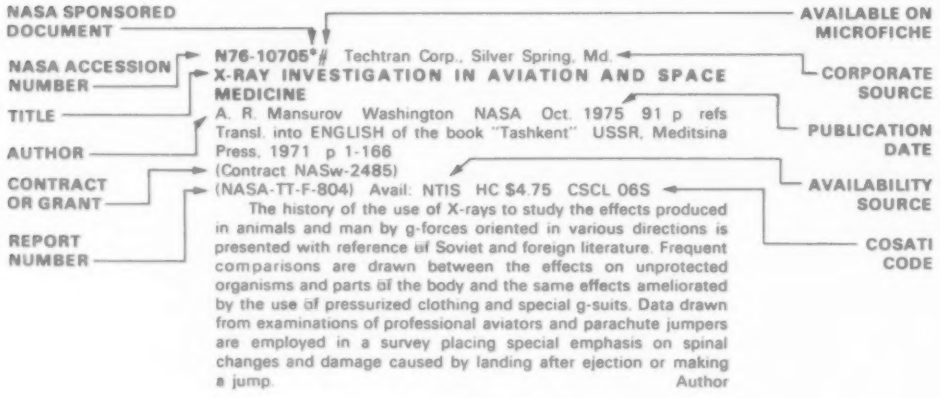
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N76-10705*# Techtran Corp., Silver Spring, Md.
X-RAY INVESTIGATION IN AVIATION AND SPACE MEDICINE
A. R. Mansurov Washington NASA Oct. 1975 91 p refs
Transl. into ENGLISH of the book "Tashkent" USSR, Meditsina Press, 1971 p 1-166
(Contract NASw-2485)
(NASA-TT-F-804) Avail: NTIS HC $4.75 CSCL 06S
The history of the use of X-rays to study the effects produced in animals and man by g-forces oriented in various directions is presented with reference of Soviet and foreign literature. Frequent comparisons are drawn between the effects on unprotected organisms and parts of the body and the same effects ameliorated by the use of pressurized clothing and special g-suits. Data drawn from examinations of professional aviators and parachute jumpers are employed in a survey placing special emphasis on spinal changes and damage caused by landing after ejection or making a jump.
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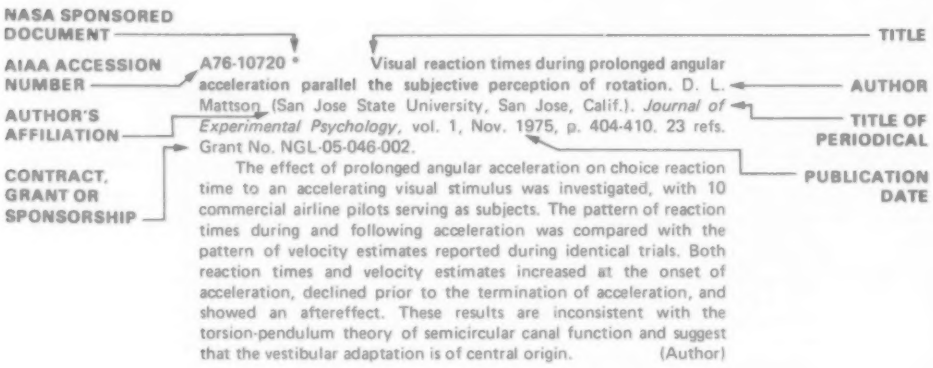
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A76-10720 * Visual reaction times during prolonged angular acceleration parallel the subjective perception of rotation. D. L. Mattson (San Jose State University, San Jose, Calif.). Journal of Experimental Psychology, vol. 1, Nov. 1975, p. 404-410. 23 refs. Grant No. NGL-05-046-002.
The effect of prolonged angular acceleration on choice reaction time to an accelerating visual stimulus was investigated, with 10 commercial airline pilots serving as subjects. The pattern of reaction times during and following acceleration was compared with the pattern of velocity estimates reported during identical trials. Both reaction times and velocity estimates increased at the onset of acceleration, declined prior to the termination of acceleration, and showed an aftereffect. These results are inconsistent with the torsion-pendulum theory of semicircular canal function and suggest that the vestibular adaptation is of central origin. (Author)

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 162)

JANUARY 1977

IAA ENTRIES

A76-44726 **Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974.** Symposium sponsored by the U.S. Army and U.S. Navy; Contract No. N00014-75-C-0406. Edited by R. A. Monty (U.S. Army, Human Engineering Laboratory, Aberdeen Proving Ground, Md.) and J. W. Senders (Toronto, University, Toronto, Canada). Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976. 560 p. $35.

The present collection of papers is concerned with recent advances in the study of the role of the vestibulo-oculomotor system in human perception and cognitive processes. Major areas discussed include the physiology of eye movement control as related to the vestibular, pursuit, saccadic, and vergence systems; the role of eye movements in vision and in maintenance of vision; the role of eye movements in reading; and eye movements and higher mental processes. Particular attention is given to measurement and recording of eye movements; target detection, search, and scanning behavior, and the relation of eye movements to the perception of motion, position, and timing of visual stimuli. Various theoretical positions are presented and discussed.

S.D.

A76-44727 **The vestibular system for eye movement control.** G. M. Jones (McGill University, Montreal, Canada). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 3-16; Discussion, p. 16, 17. Defence Research Board of Canada Grants No. 9910-37; No. 9310-92.

The vestibulo-ocular reflex system is seen as a medium through which automatic stabilization of the eye relative to inertial space is achieved over the normal range of naturally occurring angular head movements. The discussion covers errors of vestibular canal response, neural response, the elementary vestibulo-ocular reflex arc, and additional neural pathways. Particular attention is given to oculomotor responses to linear accelerative stimuli. It is shown that both rotational and linear accelerative stimuli can provide functionally effective inputs to the oculomotor system. The vestibulo-ocular reflex system is apparently capable of extensive adaptive change, always acting in such a way as to reduce retinal image slip during head movement. S.D.

A76-44728 **The physiology of pursuit eye movements.** D. A. Robinson (Johns Hopkins University, Baltimore, Md.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 19-30; Discussion, p. 30, 31. Grant No. NIH-EY-00598.

There is actually little known about the neurophysiology and neuroanatomy of pursuit or following eye movements. Good progress has been made in describing the optokinetic behavior of the simpler system of the rabbit which contains foveate vision. The paper discusses the capabilities of Collewijn's (1972) model of the rabbit's optokinetic system. With feedback provided, the rabbit's eye lock onto the visual scene and drift almost not at all, indicating that the function of the optokinetic reflex is not to make the eye move but to hold it still. Certain mechanisms are discussed relative to the fact that a little eye drift can interfere with the rabbit's behavior sufficiently to justify the evolution of an optokinetic system. Also discussed is a modification of the existing model, which uses an internal signal that is an efference copy of eye position or eye velocity. The advantage of this new system is that it behaves as if it were open loop so that it could never become unstable, and that the psychophysical percept of target velocity in space is explicitly shown as an important control variable. S.D.

A76-44729 * **Eye movements during afterimage tracking under sinusoidal and random vestibular stimulation.** S. Yasui (California Institute of Technology, Pasadena, Calif.) and L. R. Young (MIT, Cambridge, Mass.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 33-37. Grant No. NGR-22-009-025.

The smooth portion of the horizontal vestibulo-ocular reflex was analyzed in terms of the frequency response, relating slow-phase eye velocity to angular velocity of a rotating chair under four different cases: sinusoidal rotation about a vertical axis in total darkness, sinusoidal rotation during afterimage tracking, pseudo-random head rotation in total darkness, and pseudorandom head rotation during afterimage tracking. Eye movements were recorded using a photoelectric limbus tracking method. The observation that the presence of an afterimage during vestibular stimulation increases the velocity of slow-phase eye movements is in support of the theory that such slow-phase movements are generated, at least in part, by the perceived velocity of the target. Since the target is immobilized on the retina, this perceived velocity is clearly not generated by retinal slip, but rather by a mechanism related to the eye movement such as corollary discharge. S.D.

A76-44730 **The neurophysiology of saccades.** A. F. Fuch (Washington University, Seattle, Wash.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 39-50; Discussion, p. 50-53. Grants No. NIH-RR-00166; No. NIH-EY-00745.

A saccade serves to rapidly shift the direction of gaze from one object in the visual field to another in a ballistic motion. The paper discusses the saccadic trajectory itself, with special emphasis on the neurophysiology that underlies it. A complete characterization of the saccade is presented to enable pinpointing the changes in neural firing and muscle force that ultimately reflect themselves in the saccadic trajectory. The neurophysiology of the saccade is approached by starting at the saccadic trajectory and working back into the brain sequentially from the forces that move the eye, to the motoneurons that cause the muscles to contract, to the possible neural structures that provide inputs to the motoneurons. S.D.

A76-44731 **Saccadic suppression - A brief review.** F. C. Volkmann (Smith College, Northampton, Mass.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 73-83. NSF Grant No. 41103.

The paper reviews some major lines of evidence and theoretical positions regarding the apparent neglect or suppression of vision during saccadic eye movements in awake human subjects. There is enough evidence to indicate that under most normal conditions of everyday viewing, one simply does not notice the blurred images that sweep across the retina during saccades. Four major types of explanations for visual suppression are discussed: retinal smear, central inhibition, shearing forces in the retina, and visual masking. The temporal and spatial characteristics of masking interact, but the ways in which they interact to produce all or a part of saccadic suppression are not yet clear. S.D.

A76-44732 **The role of eye movements in maintenance of vision.** U. Tulunay-Keesey (Wisconsin, University, Madison, Wis.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974.
Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 101-118; Discussion, p. 108-112.

The paper focuses on the micromovements of the eye which occur during fixation and their role in the maintenance of vision in terms of acuity defined as the sensitivity of the human visual system to the size of spatial detail in the stimulus. Available data indicate that acuity is better when the eye is relatively still and that under the stabilized-image conditions the mechanisms underlying acuity are dependent on exposure time but independent of image motion. Other experimental results show that the effectiveness of the drift motion of the eye in maintaining visibility is due to the variations in temporal luminance it supplies to the receptors. An excursion over several receptors is of secondary importance in sustaining vision. S.D.

A76-44733 **Role of eye movements in maintaining a phenomenally clear and stable world.** R. M. Steinman (Maryland, University, College Park, Md.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 121-145, Discussion, p. 145-149. Grants No. NIH-EY-00325; No. NIH-EY-00598.

An outstanding aspect of human oculomotor performance is its independence from stimulus variables. It is shown that the line of sight can be maintained anywhere within or at the edges of simple forms without any influence of the form on mean fixation position or stability. Human beings may have preferences to orient the line of sight to particular places within such forms, but these preferences are not imposed by oculomotor system control characteristics. It is also found that subjects can adjust the velocity of their smooth pursuits to specified fractions of the target velocity and that they have the option of not tracking as long as they look at a stationary detail in the visual field. The human eye is capable of making microsaccades down in the 5-6 arcmin ball park without any change in the position of a stimulus in the form of a stationary point of light in an otherwise completely dark environment. Particular attention is given to the conditions under which man might be able to use these options when his head is not stabilized by artificial means. S.D.

A76-44734 **Physical characteristics of the eye used in eye-movement measurement.** L. R. Young (MIT, Cambridge, Mass.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974.
Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 157-160.

The eye contains the retina which moves with it and makes possible the subjective assessment of eye movement. The paper overviews the physical characteristics of the eye which were dealt with in greater detail by Young and Sheena (1975a). Emphasis is placed on corneoretinal potential, electrical impedance, corneal bulge, and corneal reflections. Rotation of the eye about its center produces a relative translation as well as rotation of the cornea, forming the basis for the important class of eye-movement instruments known as corneal reflection systems. Other topics include reflections from other optical curvatures in the eye-Purkinje images, the limbus, and the pupil. The pupil eccentricity can be used for eye-angle measurements. Other optical and nonoptical (artificial) landmarks are also discussed. S.D.

A76-44735 **The Purkinje-image method of recording eye position.** T. N. Cornsweet (Baylor University, Houston, Tex.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974.
Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 161-164; Discussion, p. 164, 165.

It is practically impossible to hold the translation of the eye to less than 0.05 mm. Artifacts caused by translation must be eliminated for very accurate tracking better than about 0.5 deg. When the eye rotates, the first and fourth Purkinje images both move, but they move through different distances, whereas if the eye translates, they move through the same distance. Therefore, if the two images are tracked, changes in the distance between them provide an accurate measure of rotation of the eye independent of translation. A practical system for recording eye position using the first and fourth Purkinje images is described which employs optical and electronic equipment. The instrument can track eye movements over a square field about 20 deg on a side. In a new version, head movement is allowed anywhere within a cube 1 cm on a side, mirror geometry is changed to eliminate distortion, and an electronically flickered light-emitting diode is introduced in conjunction with an automatic search mode. S.D.

A76-44736 **Ways of recording line of sight.** N. H. Mackworth (Stanford University, Stanford, Calif.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 173-178.

Most cognitive researches involve reading, picture processing, or visual choice between two or more alternatives. The paper describes the design capabilities of a practical high-speed eye-fixation recorder called the Digital Eye Camera with no bite-bar, merely a head rest, which is specifically designed to cover a specified range of requirements. This new instrument gives the spatial coordinates of the eye fixations directly from the record in numerical form, where scales for this purpose are automatically placed on the pictures of each eye. The camera is cartridge loaded and can be focused throughout the test; the camera is fixed as it needs no aiming. The viewing box into which the subject peers is small enough to be carried by car. For rapid data analysis, the X-Y coordinates for eye position and the time reading are typed out from each frame of the motion picture recording. The scale number for the grid analysis can also be placed around real scenes when these are viewed through the window obtained by removing the projection screen. S.D.

A76-44737 * **Eye movements - On-line measurement, analysis, and control.** J. Anliker (NASA, Ames Research Center, Moffett Field, Calif.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 185-199. Grant No. NGR-05-020-575; No. DAHC-72-C-0232.

The paper outlines the plans and progress related to the development of a Programmed Eye-track Recording System and Eye-coupled Ubiquitous Scene-generator known by the acronym PERSEUS. Particular attention is given to the design and implementation of a computer-based real-time eye-tracking system with associated digital scenic display capability. The accurate eye-tracker developed by Cornsweet and Crane (1973) is selected for this purpose. The discussion covers automatic detection of fixations and saccades, automatic scanpath analysis, fixation-conditional stimulation, and digital scene generation. The all-digital approach to scenic simulation not only eliminates the camera optics and electromechanical servomechanisms of TV-model systems of simulation but

also opens the way to the virtually unlimited sequencing of data-base contents and perspectives thereof. S.D.

A76-44738 **Saccades and extraretinal signal for visual direction.** L. Matin (Columbia University, New York, N.Y.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 205-219. NSF Grants No. GB-5947; No. BMS-73-01463A01; Grant No. NIH-EY-00375.

The influence of extraretinal signal on reports of visual direction is examined. Attention is focused on the validity of an earlier working hypothesis that the controlling mechanism of perception of a stable world when saccadic eye movements are made is essentially a cancellation mechanism. New evidence is presented to show that the extraretinal signal for saccades does not cancel and that it is not true that a canceling extraretinal signal shifts the relation of stimulated retinal locus and perceived visual direction at a rate that parallels the actual saccadic eye movement. The results point to the sloppiness of the visual perception of direction when visual context, smears, and masking play no role, leaving the extraretinal signal as the most substantial controlling influence. S.D.

A76-44739 **Eye movements, efference, and visual perception.** H. A. Sedgwick and L. Festinger (New School for Social Research, New York, N.Y.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 221-227; Discussion, p. 227-230.

The paper discusses a class of visual illusions or misperceptions that arise during visual tracking. The double phenomenon represented by systematic misperception of extent of a tracked spot and of direction of other spots moving nonparallel to the first is quite evident and is easily obtained in darkness under conditions which permit the eyes to follow the tracked spot well. Three such conditions are sinusoidal motion which allows for the gradual deceleration and acceleration of the eyes each time the spot reverses direction, frequencies of back-and-forth motion of no more than about 1 Hz, and velocities of no more than about 15 deg of visual angle per second. Both aspects of this phenomenon can be accounted for by stating that the perceptual system radically underregisters the velocity of smooth-pursuit eye movements. Experimental results suggest that whatever information the perceptual system has about eye movements comes from monitoring the efferent commands to the eyes rather than from any proprioceptive information coming back from the extraocular muscles. S.D.

A76-44740 **Extraretinal influences on the primate visual system.** R. H. Wurtz (National Institutes of Health, National Institute of Mental Health, Bethesda, Md.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 231-242; Discussion, p. 242-244.

Several possible physiological correlates of perceptual changes associated with eye movements in the monkey are examined. The discussion is limited to recent work on the striate area of cerebral cortex and the superior colliculus in the midbrain. Consistent differences in extraretinal influences found in the primary cortical visual area, the striate cortex, and the superior colliculus as a primary midbrain area are noted. Presumably cortical processing beyond the striate cortex incorporates more extraretinal input, particularly since one of the major projections of the superior colliculus is upward to this cortical area via the posterior thalamus. S.D.

A76-44741 **Voluntary saccades, eye position, and perceived visual direction.** J. Pola (Johns Hopkins University, Baltimore, Md.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 245-253; Discussion, p. 253, 254. NSF Grant No. GB-5947; Grant No. NIH-R01-5-EY-0037E.

Results are presented for an experimental study in which a wide enough range of saccade amplitudes is obtained to enable finding out whether there was actually an eye position effect and to determine the general quantitative features of such an effect. Two different types of experimental sessions were used under dark-adapted conditions. In the 8 deg nonadjustment session, visual direction was measured for a saccade of normal amplitude when the subject attempted to look at a target 8 deg removed from his original point of fixation; in the 8 deg adjustment session, the visual direction was determined for a saccade of reduced size when the subject tried to look at the 8 deg peripheral target. It is shown that the shift in visual direction for a saccade is related to three parameters: eye position during and following the saccade, time from the onset of the saccade, and attempt to look at a specific location. The most important finding appears to be the relation of the shift in visual direction to eye position. S.D.

A76-44742 **Saccades to flashes.** P. E. Hallett (Toronto, University, Toronto, Canada). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 255-260; Discussion, p. 260-262. Medical Research Council of Canada Grant No. MT-4092; Defence Research Board of Canada Grant No. 9310-122.

Experiments were conducted in which the target step was synchronized with the very beginning of a triggering saccade, the stimulus was blanked out for a reaction time soon after stepping the target, and the target patterns were automatically randomized from trial to trial. The use of visual information was assessed from the timing and amplitude of the fixation reflex alone. Results on dark-adapted subjects and single targets indicate that visual inflow during a primary saccade can initiate a corrective or new primary saccade and seems to be necessary to prevent strange responses and that retinal position is not the stimulus that determines saccade amplitude but rather the retinal position of the cue is corrected for any subsequent saccadic movement that happens to intervene between the cue and the saccade that it eventually elicits. It is clear that there is important visual inflow from the retina to oculomotor pathways during saccades. S.D.

A76-44743 **A psychophysical model of visual-movement perception.** R. A. Kinchla (Princeton University, Princeton, N.J.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 263-275.

A psychophysical model of visual-movement discrimination is described which is capable of characterizing the discrimination of linear fixed-velocity movement of a point of light viewed in the dark for durations in the range 0.5-2 sec. This theoretical model can be defined by two statements, the first indicating how a stimulus evokes a subjective impression of movement, and the second indicating how this impression is translated into a response. While the first statement involves the central assumptions of the model which are invariant in all of its applications, the second varies somewhat with the specific response options. The model proves useful in explaining in relatively simple terms how one can characterize a subject's ability to discriminate movement over a fairly wide range of stimuli with just a single theoretical constant acting as an estimate of the noise parameter in the range 0.2-0.3 squared deg per sec. S.D.

A76-44744 **The nature and role of extraretinal eye-position information in visual localization.** A. A. Skavenski (Northeastern University, Boston, Mass.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976,

p. 277-285; Discussion, p. 285-287. Grants No. NIH-EY-1049; No. NIH-EY-325.

The paper reviews available evidence about the nature and accuracy of extraretinal eye-position information in visual localization, suggesting that there is an accurate and easily remembered extraretinal indication of eye position. This accuracy is examined by recording attempts to maintain the eye in a defined position in the absence of visual information about eye position. It is shown that the perceived target direction is proportional to the magnitude of the outflow signals, which serves as a first-hand evidence that extraretinal eye-position information is directly involved in visual spatial perception. It is suggested that the outflow extraretinal signals originate in the pons near the final common path. It is concluded that there is accurate extraretinal eye-position information for several types of eye movement that can be used to control eye position in the dark. (Author)

A76-44745 **Pursuit eye movements and visual localization.** F. Ward (Rochester, University, Rochester, N.Y.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 289-297; Discussion, p. 297.

Results are presented of a few experiments designed to assess an observer's ability to localize a briefly presented target during the act of pursuit. The study evaluates the hypothesis that the interaction of the pulse information with the eye-position record accounts for displacement of localization in the direction of pursuit. Further analyses of eye-movement records reveal that the actual act of saccading does not seem to be related to localization judgments. The results support the original hypothesis that localization during tracking is a function of the pursuit eye-movement system and that this system must therefore have access to some type of eye-position signal. S.D.

A76-44746 **Stimulus density limits the useful field of view.** N. H. Mackworth (Stanford University, Stanford, Calif.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 307-320; Discussion, p. 320, 321. U.S. Department of Health, Education and Welfare Grant No. OE-4-10-136.

The useful field of view is referred to as the largest area around the fixation point at which visual task performance is perfect. Experiments are conducted on 20 subjects involved in a physiological study of peripheral-discrimination task and a psychological task of strip-search task, where the subjects are asked to identify a small black square in a set of black circles. It is found that the mean number of circles attempted per fixation, the mean visual fixation times, the mean percentage of sloe steps or bends in eye track, the mean number of fixations per display strip, and the incidence of missed targets permit studying the interaction between the nature of the display and the cognitive control of the visual coverage. It is concluded that the size of the useful field of view is critically determined by the density of irrelevant items in the display. One scrutinizes densely crowded visual details very narrowly, but when there are only a few scattered details the gaze can process a much wider area. S.D.

A76-44747 **A computer implementation of constructive visual imagery and perception.** A. M. Farley (Carnegie-Mellon University, Pittsburgh, Pa.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 473-490.

The constructive theory of visual form perception stipulates that an internal representation of the visual field is constructed by the integration of a succession of views of the environment. Results are presented for a research that constitutes a further investigation and specification of the constructive theory of visual form perception. The objectives were to study the nature of the processes and memories involved in the fixation and integration of successive views of the environment as well as the nature of the internal representation which is capable of embodying the necessary partial and complete perceptions. The results are specified in the form of an operational computer-implemented visual imagery and perception system (VIPS). Two experiments are conducted to provide data from which to infer the characteristics of visual image representation and the rules of perceptual processes. The results are considered in light of the theory embodied by VIPS and as a basis for its necessary extension and modification. S.D.

A76-44748 **Eye movement fixations and gating processes.** R. J. Hall (Nevada, University, Las Vegas, Nev.). In: Eye movements and psychological processes; Proceedings of the Symposium, Princeton, N.J., April 15-17, 1974. Hillsdale, N.J., Lawrence Erlbaum Associates, Inc.; New York, Halsted Press, 1976, p. 491-498. Army-ARPA-supported research.

The paper focuses on what eye movements may indicate about interpersonal perceptions and needs and about the processing of sensory data by the central nervous system (CNS). A discussion of experimental data as to whether the eye movements of heroin addicts differ from nonaddicted matched controls reveals that two factors are operating: motivational or interest factors associated with the nature of the stimulus material and possible differences in reading skill and the ability to manipulate printed material. The observation that fixation durations are generally longer for addicts than for controls suggests that there are also basic differences in the physiological and CNS processes that regulate eye movement or an underlying information processor. Results from studies involving high data acquisition rates and the analysis of substantial volumes of data indicate that the eye movements associated with fixation sequencing reflect changes in CNS temporal processes. Such results suggest that eye movements (fixation number and duration) may be a sensitive measure of gating and timing processes that group incoming sensory data. S.D.

A76-44764 **Dynamic properties of the human head.** J. B. Smith and C. W. Suggs (North Carolina State University, Raleigh, N.C.). *Journal of Sound and Vibration*, vol. 48, Sept. 8, 1976, p. 35-43. 10 refs.

The dynamic response of the human head to sinusoidal excitation in the 20-5000 Hz frequency range is determined by using driving point impedance techniques. Maximum and minimum impedance magnitudes are found near 100 and 3000 Hz, respectively. A secondary peak in impedance magnitude is observed near 200 Hz in many of the tests. Approximate linearity of the system to low level excitation is demonstrated. Segments of the impedance curves are related to vibration of specific parts of the head and the mechanical properties of constituent tissues. A two-degree-of-freedom mass-excited mechanical model is proposed to describe the dynamic behavior of the head. This model consists of the driving mass, a damper, a parallel arrangement of a spring and damper, and another mass, all connected in series. This lumped-parameter model proves suitable for an accurate representation of the dynamic behavior of the human head for situations which do not result in significant deformation or fracture of the skull. S.D.

A76-44844 * **Functional and anatomical characteristics of the nerve-brown adipose interaction in the rat.** K. E. Flaim, J. M. Horowitz, and B. A. Horwitz (California, University, Davis, Calif.). *Pflugers Archiv*, vol. 365, no. 1, 1976, p. 9-14. 26 refs. NSF Grant No. GB-30594; Grant No. NGR-05-004-099.

Experiments were conducted on 12 male rats to study the coupling of signals from the sympathetic nervous system to the brown adipose tissue. Analysis of electron photomicrographs revealed considerable morphological heterogeneity among the nerves entering and leaving the interscapular fat pad. In response to electrical simulation of the nerves, the temperature of the brown fat increased following a rapid but transient temperature drop. Such changes were observed only on the ipsilateral side, indicating that the innervation to the interscapular brown fat of the rat is functionally

bilateral rather than diffuse. The finding that brown fat is capable of responding in a graded fashion correlates well with observations suggesting that clusters of brown adipocytes may be electrically coupled. S.D.

A76-44845 **The involvement of noradrenergic nerves in the cardiovascular reflex responses to lower body negative pressure in the anaesthetised rabbit.** T. Bennett, P. H. Fentem, D. R. Tomlinson, and D. Yates (University Hospital; Nottingham University, Nottingham, England). *Pflügers Archiv*, vol. 365, no. 1, 1976, p. 89-94. 28 refs. Research supported by the Medical Research Council and Boots Pure Drug Co.

A76-44924 # **Monitored approach as initial stage in training of pilots for Category II landing (Monitorowane zblizanie jako wstepny etap treningu pilotow do II kategorii ladowan).** T. Smolicz. *Technika Lotnicza i Astronautyczna*, vol. 31, July-Aug. 1976, p. 31-33. In Polish.

The paper discusses basic principles and ergonomic procedures for monitored approach as the most effective means of cooperation on the part of the crew during landing under low-pressure weather conditions. Workload distribution among the crew during successive phases of monitored approach is suggested. P.T.H.

A76-44992 **Absolute sensitivity of rod bipolar cells in a dark-adapted retina.** J. F. Ashmore and G. Falk (University College, London, England). *Nature*, vol. 263, Sept. 16, 1976, p. 248, 249. 17 refs. Research supported by the Medical Research Council.

The investigation reported is concerned with the voltage response in flashes of light in individual bipolar cells, to which the rods of the visual system send their signals and which, in turn, signal to amacrine and ganglion cells. Measurements of the absolute sensitivity of red bipolar cells in the dogfish retina were conducted. The relationship between light intensity and peak of the response for the bipolar cell is shown in a graph. G.R.

A76-45085 # **On the problem of training aviational physicians (K voprosu o podgotovke aviatsionnogo vracha).** P. G. Kozacha. *Voenno-Meditsinskii Zhurnal*, May 1976, p. 13-15. In Russian.

The duties of aviational physicians are discussed on the basis of the author's personal experience in the field over long years. The author's viewpoints on a better training of aviational physicians on the higher education level are outlined. The great variability of flight and ground situations calls for high flexibility of thinking and rapid decision making on the part of on-duty physicians, particularly during various kinds of basic military training. More specifically, young aviational physicians must constantly learn about the organization and planning of medical care in the air forces. Periodic verification to confirm an aviational physician's qualifications is necessary both for an actual evaluation of his abilities and for stimulating him to perfect his professional skills. S.D.

A76-45086 # **Changes in the peripheral and intracranial blood circulation during prolonged low-magnitude radial accelerations (Izmeneniia pericericheskogo i vnutricherepnogo krovoobrashcheniia pri dlitel'no deistvuiushchikh radial'nykh uskoreniiakh malykh velichin).** V. V. Usachev, B. V. Ustiushin, and V. G. Ovechkin. *Voenno-Meditsinskii Zhurnal*, May 1976, p. 47-50. In Russian.

A76-45100 * **Mechanisms of temperature regulation in heat-acclimated hamsters.** S. B. Jones, X. J. Musacchia, and G. E. Tempel (Missouri, University, Columbia, Mo.). *American Journal of Physiology*, vol. 231, Sept. 1976, p. 707-712. 21 refs. Research supported by the University of Missouri; Grant No. NGL-26-004-021.

A76-45101 **Decompression-induced decrease in nitrogen elimination rate in awake dogs.** B. G. D'Aoust, K. H. Smith, and H. T. Swanson (Virginia Mason Research Center, Seattle, Wash.). *Journal of Applied Physiology*, vol. 41, Sept. 1976, p. 348-355. 36 refs. Grants No. NIH-HL-12015; No. NIH-HL-14801.

A76-45102 **Depressed myocardial function in the goat at high altitude.** C. E. Tucker, W. E. James, M. A. Berry, C. J. Johnstone, and R. F. Grover (Colorado, University, Denver, Colo.). *Journal of Applied Physiology*, vol. 41, Sept. 1976, p. 356-361. 16 refs. Research supported by the Colorado Heart Association; Grants No. DADA17-68-C-8135; No. NIH-HL-134744; No. NIH-HL-14985.

The functional state of the left ventricular myocardium was evaluated in six chronically instrumented unsedated goats before, during, and after two-week exposure to hypobaric hypoxia at a partial oxygen tension of 44 mm Hg. The force-velocity characteristics of the myocardium was examined by estimating maximum oxygen consumption (Vmax) from the left ventricular pressure wave form obtained from an implanted miniature transducer. When the influence of beta-adrenergic stimulation was removed, Vmax was consistently reduced by chronic hypoxia. The findings imply that the contractile state of the myocardium is depressed at high altitudes, and this probably contributes to the reduction in cardiac stroke volume. Failure to reverse myocardial depression with 100% oxygen is also discussed. S.D.

A76-45103 **Myocardial interaction between the ventricles.** W. P. Santamore, P. R. Lynch, G. Meier, J. Heckman, and A. A. Bove (Temple University, Philadelphia, Pa.). *Journal of Applied Physiology*, vol. 41, Sept. 1976, p. 362-368. 22 refs.

Alterations in the ventricular pressure-volume relationships and ventricle configuration caused by varying the volume of the opposite ventricle were studied on isolated flow-perfused paced rabbit hearts under isovoluminal beating. Results are presented for pressure-volume and cineradiography experiments. It is shown that the diastolic and developed pressure-volume relationships of either ventricle can be acutely altered by varying the volume of the other ventricle. The position of the interventricular septum is found to correlate with left ventricular diastolic pressure and right ventricular diastolic and developed pressure changes (P less than 0.01). In the normal physiological range, left ventricular volume augments right ventricular pressure development. S.D.

A76-45104 **Estimation of cardiac output by an N2O rebreathing method in adults and children.** E. Zeidifard, S. Godfrey, and E. E. Davies (Hammersmith Hospital, London, England). *Journal of Applied Physiology*, vol. 41, Sept. 1976, p. 433-438. 43 refs.

Stress tests were performed on nine adults aged 21-37 yr and ten children aged 7-16 yr using a nitrous oxide (N2O) rebreathing method to measure recirculation time and cardiac output (as pulmonary blood flow). The N2O rebreathing method is compared with the indirect CO2 Fick rebreathing method. It is shown that during exercise the N2O rebreathing method can be used to measure pulmonary blood flow to give values which are both reproducible and quantitatively similar to measurements of cardiac output made by invasive techniques. An advantage of the method is that cardiac output and recirculation time are both measured within a 10-sec rebreathing period, compared to the longer steady-state periods required by other methods. However, the method can be adversely affected by ventilatory abnormalities which would impair adequate mixing of rebreathed gas in the lungs, thus giving false estimates of gas uptake by pulmonary blood. S.D.

A76-45372 # **The effect of circulatory hypoxia on the direct responses of the cerebral cortex of a rabbit (Vliianie tsirkuliatornoi gipoksii na priamye otvety kory mozga krolika).** T. Sh. Labakhua (Akademiia Nauk Gruzinskoi SSR, Institut Fiziologii, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 82, May 1976, p. 473-476. 10 refs. In Russian.

A76-45447 * **The Viking biological investigation - Preliminary results.** H. P. Klein, V. I. Oyama, B. J. Berdahl (NASA, Ames Research Center, Moffett Field, Calif.), N. H. Horowitz, G. L.

Hobby (California Institute of Technology, Pasadena, Calif.), G. V. Levin, P. A. Straat (Biospherics, Inc., Rockville, Md.), J. Lederberg (Stanford University, Stanford, Calif.), A. Rich (MIT, Cambridge, Mass.), and J. S. Hubbard (Georgia Institute of Technology, Atlanta, Ga.). *Science*, vol. 194, Oct. 1, 1976, p. 99-105. 29 refs. Contracts No. NAS1-9690; No. NAS1-12311; No. NAS1-13422; Grants No. NGR-05-002-308; No. NsG-7069.

A preliminary progress report is presented for the Viking biological investigation through its first month. The carbon assimilation, gas exchange, and labeled release experiments are described in detail, and the chronology of the experiments is outlined. For the first experiment, it is found that a small amount of gas was converted into organic material in one sample and that heat treatment of a duplicate sample prevented such conversion. In the second experiment, a substantial amount of O2 was detected along with significant increases in CO2 and small changes in N2. In the third experiment, a significant amount of radioactive gas was evolved from one sample, but not from a duplicate heat-treated sample. Possible biological and nonbiological interpretations are considered for these results. It is concluded that while the experiments provide clear evidence for the occurrence of chemical reactions and while the results do not violate any prima facie criteria for biological processes, a definitive answer cannot yet be given to the question of whether life exists on Mars.
F.G.M.

A76-45516 # **On quantizing ride comfort and allowable accelerations.** P. R. Payne (Payne, Inc., Annapolis, Md.). *American Institute of Aeronautics and Astronautics and Society of Naval Architects and Marine Engineers, Advanced Marine Vehicles Conference, Arlington, Va., Sept. 20-22, 1976, AIAA Paper 76-873*. 16 p. 34 refs.

When the motion of a vehicle includes 'shocks' or impulsive velocity changes, R.M.S. acceleration has no relation to crew comfort or injury. Existing (R.M.S. 'g') methods of ride assessment can show lethal accelerations as being perfectly safe. They are also said to be invalid when the acceleration 'crest factor' (peak/R.M.S.) exceeds 3, which is often the case for high-speed marine vehicles. This paper presents methods for evading these difficulties, using fairly well established biodynamic modelling techniques, and an extension of Allen's 'shock tolerance' concept. Among other advantages, the method 'automates' the assessment of ride quality, so that personal judgments are not involved, and the relative ride quality of different vehicles can be placed on a quantitative basis. (Author)

A76-45651 * **Mathematical modeling of inhalation exposure.** V. Fiserova-Bergerova (Miami, University, Miami, Fla.). *(Conference on Environmental Toxicology, 6th, Dayton, Ohio, Oct. 1975.) Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 201-210. 9 refs. NASA-supported research; Contract No. F33615-74-C-5147.

The paper presents a mathematical model of inhalation exposure in which uptake, distribution and excretion are described by exponential functions, while rate constants are determined by tissue volumes, blood perfusion and by the solubility of vapors (partition coefficients). In the model, tissues are grouped into four pharmokinetic compartments. The model is used to study continuous and interrupted chronic exposures and is applied to the inhalation of Forane and methylene chloride.
B.J.

A76-45652 * **The sensitivity of relative toxicity rankings by the USF/NASA test method to some test variables.** C. J. Hilado, L. A. LaBossiere (San Francisco, University, San Francisco, Calif.), H. A. Leon, D. A. Kourtides, J. A. Parker (NASA, Ames Research Center, Moffett Field, Calif.), and M.-T. S. Hsu (San Jose State University, San Jose, Calif.). *Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 211-236. 13 refs. Grant No. NsG-2039.

Pyrolysis temperature and the distance between the source and sensor of effluents are two important variables in tests for relative toxicity. Modifications of the USF/NASA toxicity screening test method to increase the upper temperature limit of pyrolysis, reduce the distance between the sample and the test animals, and increase the chamber-volume available for animal occupancy, did not significantly alter rankings of relative toxicity of four representative materials. The changes rendered some differences no longer significant, but did not reverse any rankings. The materials studied were cotton, wool, aromatic polyamide, and polybenzimidazole. (Author)

A76-45653 * **The effect of changes in the USF/NASA toxicity screening test method on data from some cellular polymers.** C. J. Hilado and C. M. Miller (San Francisco, University, San Francisco, Calif.). *Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 237-258. 17 refs. Grant No. NsG-2039.

Rankings of relative toxicity can be markedly affected by changes in test variables. Revision of the USF/NASA toxicity screening test procedure to eliminate the connecting tube and supporting floor and incorporate a 1.0 g sample weight, 200 C starting temperature, and 800 C upper limit temperature for pyrolysis, reversed the rankings of flexible polyurethane and polychloroprene foams, not only in relation to each other, but also in relation to cotton and red oak. Much of the change is attributed to reduction of the distance between the sample and the test animals, and reduction of the sample weight charged. Elimination of the connecting tube increased the relative toxicity of the polyurethane foams. The materials tested were flexible polyurethane foam, without and with fire retardant; rigid polyurethane foam with fire retardant; flexible polychloroprene foam; cotton, Douglas fir, red oak, hemlock, hardboard, particle board, polystyrene, and polymethyl methacrylate. (Author)

A76-45654 * **Relative toxicity of pyrolysis products of some cellular polymers.** C. J. Hilado, G. L. Saxton (San Francisco, University, San Francisco, Calif.), D. A. Kourtides, J. A. Parker, and W. J. Gilwee (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 259-269. 8 refs. Grant No. NsG-2039.

Twelve samples of cellular polymers were evaluated in the course of developing test methods for toxic materials characterization. Six samples were flexible polyurethane foams, three were rigid polyurethane foams, two were high density rigid foams, and one was a modified polyimide foam. Some effects of formulation variables are discussed. (Author)

A76-45655 * **Relative toxicity of pyrolysis products of some synthetic polymers.** C. J. Hilado, C. L. Slattengren, A. Furst (San Francisco, University, San Francisco, Calif.), D. A. Kourtides, and J. A. Parker (NASA, Ames Research Center, Moffett Field, Calif.). *Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 270-283. 8 refs. Grant No. NsG-2039.

Nineteen samples of synthetic polymers were evaluated for relative toxicity in the course of characterizing materials intended for aircraft interior applications. The generic polymers included ABS, chlorinated PVC, polycarbonate, polyphenylene oxide, polyphenylene sulfide, polysulfone, polyaryl sulfone, polyether sulfone, polybismaleimide, and polyvinyl fluoride. Test results are presented, and compared in relative rankings with similar results on cellulosic materials and other synthetic polymers. Under these test conditions, the samples of synthetic polymers were either comparable to or significantly less toxic than the samples of commercial cellulosic materials. (Author)

A76-45657 **An investigation of potential inhalation toxicity of smoke from rigid polyurethane foams and polyester fabrics containing Antiblaze 19 flame retardant additive.** J. G. Keller (Mobil Oil Corp., New York, N.Y.), W. R. Herrera (Southwest Research Institute, San Antonio, Tex.), and B. E. Johnston (Mobil Chemical Co., Research and Development Laboratory, Edison, N.J.). *Journal of Combustion Toxicology*, vol. 3, Aug. 1976, p. 296-304. 16 refs.

A76-45773 **Imagery, affective arousal and memory consolidation.** H. Weingartner, B. Hall, D. L. Murphy, and W. Weinstein (U.S. Public Health Service, National Institute of Mental Health, Bethesda; Maryland, University, Baltimore, Md.). *Nature*, vol. 263, Sept. 23, 1976, p. 311, 312. 6 refs.

The paper points out a disparity existing between the methods and theory developed for studying human memory and those used in animal learning studies, consisting in that research on humans stresses stimulus characteristics as determinants of input-output relationships in memory, while animal learning studies have focused on neurochemical and neurophysiological conditions that alter learning or retrieval. The present study attempts to integrate the findings and theory of the two approaches through manipulations of stimulus imagery and consequent encodability and of arousal using measures which in separate studies and approaches reliably affect recall probability. P.T.H.

A76-45774 **Antagonism between visual channels for pattern and movement.** D. M. MacKay and V. MacKay (Keele, University, Keele, Staffs., England). *Nature*, vol. 263, Sept. 23, 1976, p. 312-314. 9 refs.

Georgeson (1976) reported that test subjects, after inspecting one or the other, or both, of two counter-rotating dot patterns, reported seeing 'complex patterns of radial lines or curves', which appeared either to rotate in the opposite sense to the stimulus, or to be stationary if both counter-rotating disks had been viewed simultaneously in superposition. Georgeson attributed the appearance of these patterns to the rebound response of 'pattern channels' inhibitied during stimulation by 'motion channels' of the kind presumed responsible for movement aftereffects (MAE). The present study tested this conclusion by extending the range of stimulus velocities well above and below those used by Georgeson. The results suggest that stimulation of motion channels is not necessary for the effect observed, so that its appearance does not confirm the hypothesis of Georgeson that sustained visual cortical cells sensitive to the orientation of contours are antagonistically coupled to transient cells in the same cortical column sensitive to movement at right angles to those contours. P.T.H.

A76-45775 **Technique for studying synaptic connections of single motoneurones in man.** J. A. Stephens, T. P. Usherwood, and R. Garnett (St. Thomas Hospital, London, England). *Nature*, vol. 263, Sept. 23, 1976, p. 343, 344. 10 refs.

The post-stimulus time histogram of the occurrence of the action potential of a single motor unit in the first dorsal interosseous muscle after a sharp tap to the tip of the nail of the index finger is shown and discussed. A sequence of excitation and inhibition periods is noted, the timing of which suggests that the earliest excitation and inhibition involve spinal pathways and that the later and more pronounced excitation involves supraspinal pathways. The scale of the response to such a modest and limited stimulus illustrates the powerful influence that a cutaneous afferent volley can exert on the discharge of a motoneurone. P.T.H.

A76-45841 **Reduction of pulsatile hydraulic power in the pulmonary circulation caused by moderate vasoconstriction.** H. Piene and A. Hauge (Oslo, Universitet, Oslo, Norway). *Cardiovascular Research*, vol. 10, Sept. 1976, p. 503-513. 17 refs.

Vascular input impedance and associated hydraulic power was measured in rabbit isolated lungs. The study was focused on changes in impedance and in pulsatile hydraulic power during relaxation and contraction of vascular smooth muscle. Pulsatile power was found to be at a minimum when smooth muscle tone was such that the pulmonary arterial pressure was in the physiological range, and increased both when the vessels were relaxed and further constricted. Input impedance was found to be determined mainly by the large, proximal ('extra-alveolar') arteries. (Author)

A76-45842 **On-line computation of cardiac output with the thermodilution method, using a digital minicomputer.** L. H. Snoeckx, J. L. Verheyen, A. Van de Water, P. Lewi, and R. S. Reneman (Janssen Pharmaceutica, Beerse, Belgium). *Cardiovascular Research*, vol. 10, Sept. 1976, p. 556-564. 30 refs. Research supported by IWONL.

Several techniques for calculating cardiac output were evaluated to find an accurate technique suitable for on-line digital computation. The thermodilution method was evaluated by different calculation techniques and by comparing these techniques with electromagnetic flowmeter values. Comparison of thermal dilution curves, manually calculated by the log-normal and the exponential assumption, showed a correlation coefficient of 0.978 between the two methods, the former values being 11% higher. The exponential method correlated very well with the technique, using a correction factor for injection errors. Since the exponential technique correlated well with the electromagnetic values and since it was less complicated than the technique, using correction factors, this technique was chosen for automation. Comparison of exponential calculated thermodilution values with a digital computer and manually, showed a correlation coefficient of 0.991. It is concluded that on-line computation of thermodilution curves improves the applicability of the thermodilution techniques as a means of measuring cardiac output. (Author)

A76-45895 **The visual evoked response and color discrimination.** L. D. van Hoek (Utrecht, Rijksuniversiteit, Utrecht, Netherlands). *Vision Research*, vol. 16, no. 11, 1976, p. 1255-1261. 23 refs. Research supported by the Nederlandse Organisatie voor Zuiver-Wetenschappelijk Onderzoek.

An evoked response correlate of perceptual color contrast is presented. The small temporal stimulus color modulations were brought about by colored increments on differently colored backgrounds. The fundamental role of chromatic adaptation in visual processing is discussed. Variations in shape and apparent latency of the cortical responses were the most prominent effects of color modulation. The responses were analysed by means of a multivariate technique. The evaluation of the data was based on trajectories in multidimensional vectorial diagrams. Electrophysiologically equal amounts of color contrast were defined. (Author)

A76-45896 **Lines and gratings - Different interocular after-effects.** A. Fiorentini, R. Sireteanu, and D. Spinelli (CNR, Laboratorio di Neurofisiologia, Pisa, Italy). *Vision Research*, vol. 16, no. 11, 1976, p. 1303-1309. 15 refs.

The constrast threshold for a line or for a grating is elevated following prolonged inspection of a line or a grating of high contrast and suitable orientation and spatial frequency. This after-effect (that shows a significant interocular transfer when the test pattern is a grating) does not transfer from one eye to the other when the test pattern is a single line or a pattern consisting of a small number of bars. The critical width of the pattern for the interocular transfer of the after-effect is about 0.5 degrees. These findings suggest that the detection of a line and the detection of a grating represent either two successive stages in the processing of visual signals or two parallel processes at least partially independent from each other. (Author)

A76-45897 **Response of the human eye to spatially sinusoidal gratings at various exposure durations.** L. E. Arend, Jr. (Brandeis University, Waltham, Mass.). *Vision Research*, vol. 16, no. 11, 1976, p. 1311-1315. 21 refs.

The shapes of human spatial contrast sensitivity functions for sinusoidal luminance patterns are strongly dependent upon exposure duration, exhibiting a linear low frequency decline of threshold for long exposures and no decline for brief exposures. This result confirms earlier work with square-wave patterns but conflicts with some sine-wave experiments. The results can be interpreted as indicating that narrow-band spatial channels at low spatial frequencies are approximately equal in sensitivity when temporal properties of the mechanisms are taken into account. They also have bearing upon models for the Craik-O'Brien-Cornsweet phenomenon. (Author)

A76-45929 * # **Gravitational dynamics of biosystems - Some speculations.** J. O. Kessler (Arizona, University, Tucson, Ariz.) and M. Bier. *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 27 p. 30 refs. Contract No. NAS8-29566.

The response of organisms to gravity is generally discussed in terms of hypotheses involving sedimentation and other static effects. This paper considers several complex, inhomogeneous fluid-containing systems that are intended to model some possible dynamic effects of gravity on biosystems. It is shown that the presence of gravity may result in modified long range transport, concentration oscillations, and broken symmetries. The magnitude of density-gradient-driven convective transport times, and their ratios to diffusive transport times, are calculated for cell dimensions of six different plant varieties. The results indicate that further investigation of gravitational convection effects may be realistic in some cases and is definitely not in others. The results of this paper should aid in the planning of 'zero-gravity' experiments concerning plant geotropism and bio-materials processing. (Author)

A76-46020 # **Comparison of the light flash phenomena observed in space and in laboratory experiments.** P. J. McNulty, V. P. Pease (Clarkson College of Technology, Potsdam, N.Y.), and V. P. Bond (Brookhaven National Laboratory, Upton, N.Y.). *COSPAR, Plenary Meeting, 19th, Philadelphia, Pa., June 8-19, 1976, Paper.* 15 p. 17 refs.

Astronauts on Apollo and Skylab missions have reported observing a variety of visual phenomena when their eyes were closed and adapted to darkness. These observations were studied under controlled conditions during a number of sessions on board Apollo and Skylab spacecraft and the data available to date on these so-called light flashes is in the form of descriptions of the phenomena and frequency of occurrence. Similar visual phenomena have been demonstrated in a number of laboratories by exposing the eyes of human subjects to beams of neutrons, alphas, pions, and protons. More than one physical mechanism is involved in the laboratory and space phenomena. No direct comparison of the laboratory and space observations has been made by observers who have experienced both. However, the range of visual phenomena observed in the laboratory is consistent with the Apollo and Skylab observations. Measured detection efficiencies can be used to estimate the frequencies with which various phenomena would be observed if that subject was exposed to cosmic rays in space. (Author)

A76-46034 * # **An objective determination of /+/G-sub z acceleration tolerance.** H. Sandler, S. A. Rositano, and E. P. McCutcheon (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-034.* 8 p. 25 refs.

The paper describes a method for objective determination of (+)G-sub z (head-to-foot) acceleration tolerance. Using noninvasive instrumentation based on a transcutaneous Doppler flow system, objective end point criteria have been developed based on measured blood flow to the head. The system consists of miniature 8 MHz Doppler sensors placed on the forehead over both frontal branches of the temporal arteries to detect blood flow velocity from backscattered ultrasound. Over 100 subjects have been studied during more than 2000 centrifuge runs. (Author)

A76-46035 * # **Space motion sickness medications - Interference with biomedical parameters.** J. Vernikos-Danellis, C. M. Winget (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.), C. S. Leach (NASA, Johnson Space Center, Houston, Tex.), L. S. Rosenblatt (Geneticon, Oakland, Calif.), J. Lyman, and J. R. Beljan (Wright State University, Dayton, Ohio). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-036.* 6 p. 8 refs.

The possibility that drugs administered to Skylab 3 and 4 crewmen for space motion sickness may have interfered with their biomedical evaluation in space is investigated. The mixture of scopolamine and dextroamphetamine produced changes which allow a more valid interpretation of the early biomedical changes ocurring in weightlessness. There is no doubt that the dramatic increase in aldosterone excretion is not attributable to the drug, while the drug could have contributed to the in-flight changes observed in cortisol, epinephrine, heart rate and possibly urine volume. B.J.

A76-46036 # **Evaluation of technology for spacecraft water-waste processing systems.** J. M. Spurlock (Georgia Institute of Technology, Atlanta, Ga.), M. Modell (MIT, Cambridge, Mass.), and D. F. Putnam (Umpqua Research Co., Myrtle Creek, Ore.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-043.* 7 p. 9 refs.

Methodology has been developed to aid in (1) comparison and evaluation of design concepts for spacecraft waste and water processing systems, and (2) planning and management of technology development for such systems. The procedure provides a common basis for comparison, using available test data and standardized input/output models. It also provides an appropriate tradeoff model and analysis technique for comparing the commonly-based alternative processes. Needed technology developments, to improve performance prospects, can be identified and managed based upon results of this evaluation procedure. Results demonstrated the effectiveness and management benefits of this methodology. (Author)

A76-46037 * # **A prototype carbon dioxide and humidity control system for Shuttle mission extension capability.** R. J. Cusick (NASA, Johnson Space Center, Houston, Tex.) and A. M. Boehm (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-045.* 12 p. Contract No. NAS9-13624.

This paper describes an advanced regenerable carbon dioxide (CO2) and humidity control system being developed for the NASA Johnson Space Center. The system offers substantial weight advantages in comparison with the baseline Shuttle Orbiter expendable, lithium hydroxide CO2 removal system for extended missions beyond the nominal design of 4 men for 7 days. The regenerable system offers a potential weight savings of 431 kg for a 7-man 30-day mission. A regenerable sorbent material designated as HS-C coadsorbs CO2 and water vapor from the cabin atmosphere and desorbs the CO2 and H2O vapor overboard when exposed to the space vacuum. In addition to a comparison of the regenerable system with the baseline Shuttle expendable system, HS-C mission simulation test results and the flight prototype regenerable system currently being fabricated are presented. The paper shows the integration of the system into the Shuttle Orbiter vehicle; exclusive of cryogenic fuel-cell power expendables, the available packaging envelope is sufficient to stow all expendables necessary for HS-C operation on 30-day extended missions. (Author)

A76-46038 * # **Shuttle era waste management and biowaste monitoring.** R. L. Sauer (NASA, Johnson Space Center, Houston, Tex.) and G. L. Fogal (General Electric Co., Valley Forge, Pa.). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-046.* 10 p.

The acquisition of crew biomedical data has been an important task on manned space missions. The monitoring of biowastes from the crew to support water and mineral balance studies and endocrine studies has been a valuable part of this activity. This paper will present a review of waste management systems used in past programs. This past experience will be cited as to its influence on the Shuttle design. Finally, the Shuttle baseline waste management system and the proposed Shuttle biomedical measurement and sampling systems will be presented. (Author)

A76-46127 # **Problems of creating closed biological life support systems.** I. I. Gitelson, I. A. Terskov, B. G. Kovrov, G. M. Lisovskii, and F. Ia. Sidko (Akademiia Nauk SSSR, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper 76-040.* 3 p.

The paper describes an experiment examining the feasibility of a closed biological life support system involving three men and lasting six months. A photosynthetic regenerative process was used to recover oxygen from atmospheric CO2 and also to recover potable and wash water. A certain amount of grain and vegetables was also grown in the system. All the processes were controlled by the men. Some problems concerning the further development of biological life support systems are considered including the problem of improving the degree of metabolic closure of the ecosystem. B.J.

A76-46153 # **Some aspects of the problem of increasing space flight safety.** Iu. P. Artiukhin, G. M. Kolesnikov, N. V. Krylova, and I. B. Solov'eva (Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *International Astronautical Federation, International Astronautical Congress, 27th, Anaheim, Calif., Oct. 10-16, 1976, Paper A-76-02.* 5 p. 9 refs.

The paper reviews results of experimental studies on evaluation of the usefulness of parachute jumping as a convenient model for investigating the psychophysiological state of astronauts under stress. Parachute jumping is noted to comprise all the components of a goal-aimed activity: present situation, anticipated situation, and future real situation, along with motivation and decision making. Parachute jumping for accuracy is shown to be a psychoemotionally stressed situation allowing for simulation of a subject's goal-aimed activity with the aim of developing the necessary psychomotor skill for appropriate response in case of emergency. It is shown that parachute jumping with additional tasks is an effective tool for psychological conditioning of astronauts for activities involving emergency situations. S.D.

A76-46301 **Visual elements in flight simulation.** J. L. Brown (Rochester, University, Rochester, N.Y.). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 913-924. 20 refs. Contract No. N00014-75-C-0406.

The paper reviews information collected on visual simulation techniques, visual information sources, and electronically generated displays. Dimensions of the visual display are discussed in terms of extent of the simulated visual field, range of luminances, color, spatial resolution, and visual movement. Criteria for simulation evaluation are examined together with motion simulation quantitative indices of performance. The importance of including a simulation of the external world is recognized. Recommendations are made for future research topics, techniques, and strategies. Information on the relative precision necessary for various dimensions of a visual simulation will be extremely useful in the design of both physical and electronic systems. If spatial resolution is shown to be of great importance, more effort should be devoted to high-resolution laser displays. S.D.

A76-46302 **Stress in air traffic controllers - Effects of ARTS-III.** C. E. Melton, R. C. Smith, J. M. McKenzie, S. M. Hoffmann, and J. T. Saldivar (FAA, Aeronautical Center, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 925-930. 13 refs.

Physiological, biochemical, and psychological assessments of stress in air traffic controllers were made at Los Angeles (LAX) and Oakland (OAK) Terminal Radar Approach Control (TRACON) facilities before and after installation of Automated Radar Terminal Systems-III (ARTS-III). Heart rates of controllers on duty or at rest scarcely changed from before to after ARTS-III installation. Total stress increased at both TRACONs, and the increase was entirely due to elevated catecholamine excretion. Steroid excretion was significantly reduced at both facilities after ARTS-III installation. Scores on the A-State scale of the State-Trait Anxiety Inventory indicated that introduction of ARTS-III had no appreciable effect on work-related anxiety levels of controllers. The post-ARTS-III A-State means for both facilities were no significantly elevated. A-Trait was unchanged at LAX but decreased significantly at OAK. Assessments of A-State showed significant work related increments but tended to be low. There were no correlations between anxiety and physiological data. (Author)

A76-46303 **Nystagmus, turning sensations, and illusory movement in motion sickness susceptibility.** J. M. Lentz (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 931-936. 27 refs. Research supported by the University of Oklahoma.

A76-46304 **Effect of sequential anti-G suit inflation on pulmonary capillary blood flow in man.** R. Begin, R. Dougherty, E. D. Michaelson, and M. A. Sacker (Mount Sinai Medical Center, Miami Beach, Fla.). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 937-941. 18 refs. Contract No. F41609-74-C; Grant No. NIH-HE-10622.

Previous studies have shown that the pulmonary capillary blood flow (Qc/min) increases 31% after standard anti-G suit inflation in the 90 deg erect posture and that Qc/min is not affected by anti-G suit inflation in the sitting or supine positions. The paper tests the hypothesis that the suit might be more effective if inflated sequentially from below upward where the separated bladders were filled sequentially from calf to thigh to abdomen. Experiments are conducted to evaluate the hemodynamic effects of the modified anti-G suit on Qc/min during supine resting posture and after a 90 deg head-up (standing) tilt and to compare the results with the standard USAF anti-G suit inflation during the same maneuvers. It is shown that leg bladder inflation is a crucial element of the anti-G suit and that sequential filling of the bladders from calf to abdomen may further increase G tolerance by increasing the venous return to the heart. The modified anti-G suit may also be useful in treatment of postural hypotension and circulatory shock related to decreased venous return. S.D.

A76-46305 **Protection of airline flight attendants from hypoxia following rapid decompression.** D. E. Busby, E. A. Higgins, and G. E. Funkhouser (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 942-944.

To determine the maximum time for working flight attendants to effectively initiate airline passenger mask donning after onset of a rapid, severe decompression, we exposed 10 subjects in two series of tests to a decompression from 6,500 to 34,000 ft (2,000 to 10,400 m) in 26 sec, followed by descent at 5,000 ft/min (1,500 m/min) while subjects performed a light-to-moderate workload. Supplemental oxygen was provided in one series from a compressed oxygen system, and in the other series from a chemical oxygen generator system. With delays to mask donning of 10 and 15 sec, no hypoxic effects occurred. With delays of 20 and 25 sec, increasing hypoxic effects, similar in frequency for the two systems, occurred. Some technical problems in mask donning contributed to losses of consciuousness with the latter two delays. (Author)

A76-46306 **Changes in blood enzyme activity and hematology of rats with decompression sickness.** D. J. Freeman and R. B. Philp (Western Ontario, University, London, Canada). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 945-949. 14 refs. Research supported by the Defence Research Board of Canada.

A76-46307 **Identification of an apprehension effect on physiological indices of thermal strain.** M. H. Harrison and C. Saxton (RAF, Institute of Aviation Medicine, Farnborough, Hauts., England). *Aviation, Space, and Environmental Medicine,* vol. 47, Sept. 1976, p. 950-953. 9 refs.

Experiments were conducted on eight male subjects aged 24-37 yr to evaluate the additional thermal strain produced when a protective clothing assembly (PCA) was worn in addition to a normal

flying clothing assembly (FCA). The experimental design adopted involved condition replication, i.e., each subject in the evaluation took part in two 'control' (FCA only) and two 'test' (FCA + PCA) experiments. The measurements concerned climatic factors, deep body temperature, skin temperature, and heart rate. The data were analyzed by analyses of variance of the absolute values of each physiological measure, and also of increments above the mean of steady-state measurements made during the last 15 min of the rest period. It is shown that condition replication revealed a significant apprehension effect which confounded the physiological variables used to evaluate the thermal strain, leading to an overestimation of the severity of thermal strain. In addition, there was a large between-subject variation among the eight subjects, which made the arithmetic mean a potentially misleading statistic for evaluating the increased physiological strain caused by PCA during heat exposure. S.D.

A76-46308 **Selective toxicity of 1 atmosphere of oxygen during morphogenesis of two Lepidopterans.** O. R. Brown and M. B. Hines (Missouri, University, Columbia, Mo.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 954-957. 14 refs.

Continuous and interval exposures to 1 atmosphere of oxygen (hyperoxia) were examined using insects. Hyperoxia did not affect hatchability of Heliothis zea or Trichoplusia ni. Continuous hyperoxia was 100% lethal for H. zea and T. ni. Most insects died as larvae and pupae of H. zea which resulted were deformed, reduced in weight, and failed to emerge. Hyperoxic exposures of T. ni for 48 h at sequential 48-h intervals during development, revealed that first instar and prepupae were most sensitive to hyperoxia and 80% were killed when exposed to only 24 h of hyperoxia as prepupae. T. ni which survided hyperoxia exposures at all development stages tested, were capable of producing progeny. The differential hyperoxic sensitivity and its correlation with specific morphogenetic stages suggest the usefulness of these insect species for studying biochemical sites of oxygen toxicity. (Author)

A76-46309 **Mathematical model of man's tolerance to cold using morphological factors.** J. Timbal, M. Loncle, and C. Boutelier (Aerospace Medical Laboratory, Bretigny-sur-Orge, Essonne, France). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 958-964. 40 refs.

A mathematical model has been developed to anticipate the physiological responses and the thermal state of a naked human under exposure to cold, taking into account his morphological characteristics (skinfold, size, weight) and the environmental conditions (air or water temperature and velocity, barometric pressure and hygrometry). The skinfold conditions the body's thermal conductance and the metabolism depends both on rectal (Tre) and mean skin (Tsk) temperatures. After being tested, this model was used to study the evolution of Tre. It shows the influence of the skinfold which accounts for most of the interindividual differences. It also permits discussion of survival possibilities during immersion and completes data provided by previously established curves. (Author)

A76-46310 **Physiological effects of solar heat load in a fighter cockpit.** S. A. Nunneley and L. G. Myhre (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 969-973. 19 refs.

Bubble canopies in new fighter aircraft are known to improve crew vision but also to permit high radiant heat loads in the cockpit during daylight flight. Results are presented for an experimental study on eight young subjects to evaluate the effects of closed cockpit with a bubble canopy on man in sun and in shade. The aircraft under test was modified to permit ventilation by external ground carts. It is shown that heat stress, which alone presents no physiological hazard, may degrade crew performance and diminish acceleration tolerance. Several methods are available to reduce cockpit heat stress or ameliorate its effects. Shading the cockpit until taxi for takeoff would be a great improvement. Another useful passive measure would be incorporation of a reflective layer into at least some areas of the canopy. S.D.

A76-46311 * **Intravascular bubbles associated with intravenous injections and altitude.** J. P. Cooke, R. M. Olson, and R. D. Holden (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 974-978. 36 refs. NASA Order T-82170.

Ultrasonically detected microbubbles were more abundant in the pulmonary artery of dogs intravenously injected with 10 ml of saline than in the same noninjected control during 10,000 ft (3,048 m), 20,000 ft (6,096 m), and 40,000 ft (12,121 m) exposures. Continuous intravenous (i.v.) drip infusions also introduced many small bubbles. Since they may serve as 'nuclei' for visible intravascular bubble formation, are sometimes associated with decompression sickness, and are additionally considered undesirable, it would appear prudent to minimize i.v. injections immediately before flights. However, a 10-min delay before ascent wil reduce their number and a 60-min delay will insure their almost complete absence. Also, slow ascent, a 1-h denitrogenation time, or use of a degassed solution will help reduce their total number. (Author)

A76-46312 **Psychomotor test performance and sleep patterns of aircrew flying transmeridional routes.** L. Buck (National Research Council, Control Systems Laboratory, Ottawa, Canada). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 979-986. 17 refs.

Pilots and flight attendants flying scheduled services between Vancouver and Tokyo and between Toronto and Rome were tested on a tracking task before and after flights in each direction. Flights were included in schedules involving both 24-h and 7-d layovers at the overseas station. During these periods, they recorded their sleep patterns. The data showed that, following flight, subjects made an immediate attempt to adapt their behavior to local time and the changes in their performance scores could be interpreted on that basis. It was concluded that behavioral circadian rhythms adapt rapidly to a new time zone. (Author)

A76-46313 **Long-duration exposure to intermittent noises.** D. L. Johnson, C. W. Nixon, and M. R. Stephenson (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 987-990. 5 refs.

Experiments were conducted on 12 college-age male subjects with normal hearing to evaluate the effects of interruption of noise by period of quiet on the growth and recovery of temporary threshold shift (TTS) of hearing over a 24-hour exposure period. Monaural threshold of hearing was measured prior to, during, and following exposure of the test ear of the subjects. The basic noise exposure was a 'pink' noise presented at a level of 85 dbA. Various patterns of interruption of continuous noise were tested. Major conclusions are that the growth of TTS clearly reached an asymptote for all interrupted exposure conditions even for a TTS as small as 5 dB and that the interrupted exposures produced lower asymptotic levels than the continuous exposure with the same amount of energy. The TTS recovery patterns were basically the same at 1 hr and beyond, for all conditions. Following a long exposure, one should be provided at least as much time for recovery as the duration of the exposure. S.D.

A76-46314 **Perception of everyday visual environments during saccadic eye movements.** M. Gresty, E. Trinder, and J. Leech (National Hospital, London, England). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 991, 992. 6 refs.

Subjects were required to execute saccadic eye movements in the horizontal plane which passed through primary gaze. During the saccades, visual images were projected onto a screen which subtended 40 deg horizontally and 26 deg vertically and was centered on primary gaze. Content, contrast, and intensity of the stimulus patterns and level of illumination of the laboratory background were manipulated to maximize pattern recognition. Little or no detail of the projected images could be discerned under any conditions. Only horizontal laminations were perceived as blurs of appropriate color. It is concluded that there is no useful perception of the everyday environment during saccades. (Author)

A76-46315 **Screening test for decompression sickness.** G. B. Hart (U.S. Navy, Naval Regional Medical Center, Corpus Christi, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 993, 994. 9 refs.

Fibrin-fibrinogen degradation products (FDP) tests were performed on 18 male patients with a history of sickness associated with recent diving, prior to hyperbaric oxygen therapy with or without administration of coagulants depending on Type I and Type II decompression sickness. It is shown that the FDP test may be useful in both diagnosis and therapy of serious cases of decompression sickness when disseminated intravascular coagulation (DIC) is present. While a borderline DIC Type I or II of decompression sickness does not necessarily warrant anticoagulation, it nevertheless shows the possible diagnostic importance of the FDP test which, when elevated, may suggest that anticoagulation therapy is indicated. S.D.

A76-46316 **Incidence of decompression sickness in Navy low-pressure chambers.** R. Bason (U.S. Navy, Patuxent River, Md.), H. Pheeny, and F. E. Dully, Jr. (U.S. Naval Aerospace Medical Institute, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 995-997. 8 refs.

The study reports the incidence of decompression sickness occurring in altitude chambers in association with physiological training of aircrews for a period of four years. There were 79 cases of decompression sickness in 88,520 altitude chamber exposures, an incidence of 0.089%. Among trainees, there were 22 cases in 73,561 exposures, an incidence of 0.029%. Among chamber inside observers, there were 57 cases in 14,959 exposures, an incidence of 0.38%. This 12-fold greater incidence among inside observers over trainees was statistically significant (p less than 0.01). Reasons for the increased incidence of decompression sickness among inside observers are discussed. (Author)

A76-46317 **Characteristics of ultrasonic scattered signals from emboli in blood.** R. J. Albright (Portland, University, Portland, Ore.). *Aviation, Space, and Environmental Medicine*, vol. 47, Sept. 1976, p. 998, 999. 12 refs.

Received ultrasonic scattered signal expressions are presented for the case of an individual scatterer moving through a Gaussian beam pattern. The return signal is of a burst-like nature and oscillates as a function of time under a Gaussian amplitude envelope. Results are presented to show specific parameter dependence on the scatterer motion and beam configuration to aid in the use of the technique of ultrasonic scattering for detecting and monitoring the motion of emboli formed in blood during decompression or open-heart surgery. (Author)

A76-46457 **New progress in robotics.** D. L. Waltz (Illinois, University, Urbana, Ill.). In: Annual Allerton Conference on Circuit and System Theory, 13th, Monticello, Ill., October 1-3, 1975, Proceedings. (A76-46454 24-59) Urbana, Ill., University of Illinois, 1976, p. 151-157. 9 refs. Grant No. DAAB07-72-C-0259.

The paper describes two research projects in artificial intelligence. The first consists of real-time motion tracking and hand-eye coordination, and can be applied to assembly line tasks, the precise assembly of objects, and the control of the pan, tilt and zoom facilities of a camera. The second consists of a system to do real-time planning in an environment where critical variables may either change unpredictably or may be simply unavailable to the program. In such cases, the program must often begin executing a plan before it has completed the plan. B.J.

A76-46463 **Neural control of the cardiovascular system and orthostatic regulation; Proceedings of the International Symposium, Basel, Switzerland, April 24-26, 1975.** Symposium sponsored by the European Society of Cardiology. Edited by H. Denolin and J. C. Demanet (Saint-Pierre Hospital, Brussels, Belgium). *Cardiology*, vol. 61, Supplement 1, 1976. 365 p. In English and German.

Advances in cardiovascular control and orthostatic regulation are examined, with special emphasis on pathophysiological and clinical aspects of the problems involved. Four major areas are discussed: nervous anatomy and physiology of cardiovascular control and orthostatic regulation; physiopathology and clinical aspects of cardiovascular dysregulation - especially orthostatic; clinical aspects of orthostatic dysregulation; and therapy of orthostatic disorders. Featured topics include neurophysiology of the carotid sinus receptors in normal and hypertensive animals and humans, baroreceptor reflex function in patients with cerebrovascular disease, effect of selected drugs on arterial pressure response to upright posture, and pharmacological basis of the treatment of orthostatic disorders with ergot alkaloids.

Individual items are announced in this issue. S.D.

A76-46464 **Reflexes from receptors in the heart.** R. J. Linden (Leeds University, Leeds, England). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 7-30. 66 refs.

The paper reviews the characteristic features of nervous receptors in the heart, which when stimulated cause changes in the heart rate and blood pressure as well as enhance the urine flow. The discussion covers ventricular and atrial receptors, increase in heart rate, absence of positive inotropic response, effect on peripheral resistance and respiration, and effect of acidaemia. Increase in urine flow is discussed in terms of the view that it is caused by a reflex from the atrial receptors with the afferent limb in the vagus. It is concluded that stimulation of atrial receptors involves two responses: an increase in heart rate resulting from changes only in efferent sympathetic nerves (and no positive inotropic response), and an increase in urine flow caused by a blood-borne diuretic substance and involving changes in activity in efferent sympathetic nerves to the kidney with no known function but possibly involving renal blood flow. S.D.

A76-46465 **Neurophysiology of the carotid sinus receptors in normal and hypertensive animals and man.** P. Sleight (Radcliffe Infirmary, Oxford, England). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 31-43; Discussion, p. 43-45. 21 refs. Research supported by the British Heart Foundation, Australian Heart Foundation, and Medical Research Council.

A76-46466 **Role of cardiovascular receptors in the control of ADH release.** L. Share (Tennessee, University, Memphis, Tenn.). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 51-63; Discussion, p. 63, 64. 33 refs. Grants No. NIH-HL-12990; No. NIH-HL-14242; No. NIH-HL-09495.

Reduction in blood volume is an effective stimulus for the release of vasopressin (ADH) from the neurohypophysis. The paper reviews the nature of the volume stimulus for ADH release and the properties of the cardiovascular receptors which function as volume receptors. It is shown that volume control of ADH release can respond to quite small changes in blood volume. This control is achieved by changes in activity of atrial stretch receptors and arterial baroreceptors, known as volume receptors. The atrial receptors may be of primary importance with respect to the increased release of ADH which occurs in response to small to moderate, nonhypotensive hemorrage. The volume control system for ADH may adapt to slow long-term changes in vascular volume, but not to short-term changes in volume. The role of ADH should be integrated into any overview of cardiovascular regulation. S.D.

A76-46467 Neurogenic influences on blood pressure and vascular tone from peripheral receptors during muscular contraction. D. L. Clement (Gent, Rijksuniversiteit, Ghent, Belgium). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 65-68; Discussion, p. 68. 15 refs.

A76-46468 The physiology of orthostatic regulation (Die Physiologie der orthostatischen Regulation). H. Rieckert (Kiel, Neue Universität, Kiel, West Germany). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 69-76; Discussion, p. 76, 77. 17 refs. In German.

The article draws a picture of the sequence of events by which the heart and vessels adapt themselves to maintain arterial pressure during orthostasis. Arterial pressure is regarded as being integrated in a control loop and depending on three parameters: blood volume, heart dynamics, and peripheral resistance. When the body assumes the standing position initially the blood flow to the lower body regions increases by 100%, and within one to two minutes the venous pressure in the feet can attain 100 mm Hg, resulting in a volume change of about 200 cu cm in both legs. This volume of blood is withdrawn from the circulation. The heart is able in a short time to put out an increased stroke volume by unloading the central blood volume (lung and end-systolic volume), in order to compensate for the orthostatic load. After continued standing the stroke volume decreases below the initial value. P.T.H.

A76-46469 Orthostatic no-delay regulation (Zur orthostatischen Sofortregulation). H. de Marées (Hannover, Medizinische Hochschule, Hanover, West Germany). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 78-90. 15 refs. In German.

A series of orthostatic tests on the extent of blood volume shifts to the lower extremities were performed to objectify complaints of patients during early orthostatic regulation. From test to test the pooled blood volume could vary by up to 250 per cent, while maximal arterial influx to the lower extremities and maximal heart rate increased at the same time. Under standardized test conditions, fourteen labile patients were orthostatically loaded, of which 57 per cent collapsed. Upon fourteen-day administration of dihydroergotamine, the percentage of collapsing subjects was reduced to 7 per cent. A decrease in the simultaneously measured changes in circulatory parameters was also noted. The importance of the dicroty quotient of the arterial pulse as diagnostic criterium for detection of orthostatic early regulation disorders is emphasized. P.T.H.

A76-46470 Central and peripheral catecholamine mechanisms in circulatory control. J. L. Reid and C. T. Dollery (London, Royal Postgraduate Medical School, London, England). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 113-124. 50 refs. Research supported by the Wellcome Trust and Medical Research Council of England.

Recent direct evidence of peripheral sympathetic involvement in circulatory control is reviewed. Results are presented which implicate catecholamines acting as neurotransmitters within the central nervous system, which participate in the central regulation of autonomic outflow. Studies of the cardiovascular effects of the catecholamine precursor, levodopa, in Parkinsonian patients reveal that in man these central and peripheral noradrenergic mechanisms are involved in the control of blood pressure and baroreflex function. It is concluded that the contribution of adrenergic mechanisms to neural regulation of blood pressure involves not only the peripheral postganglionic sympathetic innervation of vascular smooth muscle, but also a central mechanism which can modify baroreceptor reflex sensitivity and the level of supine blood pressure. Significant impairment of peripheral sympathetic neurones is likely to lead to impaired baroreflex compensation and to orthostatic hypotension. S.D.

A76-46471 * Alterations on orthostatic tolerance after myocardial infarction and in congestive heart failure. W. H. Abelmann (Harvard University, Boston, Mass.). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 236-247; Discussion, p. 248. 13 refs. Grants No. NIH-HL-10539; No. NIH-HL-5909; No. PHS-FP-76; No. NsG-595.

A76-46472 Relationships between training condition and orthostatic tolerance (Beziehungen zwischen Trainingszustand und Orthostasetoleranz). J. Stegemann (Köln, Deutsche Sporthochschule, Cologne, West Germany). *(European Society of Cardiology, International Symposium on Neural Control of the Cardiovascular System and Orthostatic Regulation, Basel, Switzerland, Apr. 24-26, 1975.) Cardiology*, vol. 61, Supplement 1, 1976, p. 256-263; Discussion, p. 263-266. 13 refs. In German.

Investigations on orthostatic tolerance and physical fitness prior to and after 6-8 h immersion experiments surprisingly revealed that all untrained subjects endured pre- and postimmersion tilt table tests without subjective complaints, whereas after immersion all trained participants collapsed within the first minutes of erect position displaying symptoms of a vasovagal syncope. Assuming that this impaired orthostatic tolerance of trained subjects can partially be referred to influences of an altered blood pressure control system, it was decided to record the blood pressure characteristics of both groups. The transmural pressure of the carotid artery was changed by applying from outside either reduced or exceeding pressures. The controller sensitivity in the untrained group was almost twice as high as in the trained one. This implies a better regulatory response to disturbing interference in the untrained. Under normal conditions the controlling capacity of both groups is sufficient to cope with body position changes. However, during stress situations - in this case, reduction of aldosterone concentration as well as losses of plasma volume due to the 'Gauer-Henry-Reflex'-blood pressure regulation first fails in the trained subjects. (Author)

A76-46592 * # Thermophysical properties of foodstuffs. L. C. Witte, Y.-T. E. Cheng, and J. E. Cox (Houston, University, Houston, Tex.). *American Society of Mechanical Engineers and American Institute of Chemical Engineers, Heat Transfer Conference, St. Louis, Mo., Aug. 9-11, 1976, ASME Paper 76-HT-59*. 11 p. 41 refs. Members, $1.50; nonmembers, $3.00. Contract No. NAS9-11676.

Minimum overall nutritional deterioration of foodstuffs is generally attained by maximizing the rate of heat input and minimizing the duration of heating. Measurement of thermophysical data for foodstuffs is discussed in terms of specific heat, latent energy, enthalpy, thermal conductivity, thermal diffusivity, and density. Since phase change in foodstuffs occurs over a temperature range rather than at a discrete temperature, enthalpy is preferred over sensible and latent energy measurements as it can be used to fix the state of a sample very accurately; also, in the fusion process there is no precise way of separating sensible and latent energies. The first step in determining property data for foodstuffs is to describe the material in conventionally accepted terms. Future work should be concentrated in the area of thermal diffusivity and enthalpy measurements. S.D.

A76-46686 Importance of the nervous system in the initiation and treatment of cardiac arrhythmias; Proceedings of the Symposium, University of California, Davis, Calif., August 17-21, 1975. Symposium sponsored by the American Society for Pharmacology and Experimental Therapeutics. Edited by R. A. Gillis and K. M. Kent (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *Cardiology*, vol. 61, no. 1, 1976. 86 p.

Six papers are presented pertaining to the effect of the nervous system on the initiation and treatment of cardiac arrhythmias. Attention is focused on the role of the nervous system in the genesis of cardiac arrhythmias occurring during the early phase of acute myocardial infarction. The role of autonomic imbalance in the genesis of cardiac arrhythmia is stressed. New concepts are set forth regarding the important beneficial effects of the vagus nerves in the prevention of ventricular arrhythmias and the deleterious effects of atropine in experimental myocardial infarction, along with the arrhythmogenic potential of sympathetic hyperactivity in myocardial infarction.

S.D.

A76-46687 **Central nervous system control of cardiac rhythm.** J. W. Manning (Emory University, Atlanta, Ga.). *(American Society for Pharmacology and Experimental Therapeutics, Symposium on the Importance of the Nervous System in the Initation and Treatment of Cardiac Arrhythmias, Davis, Calif., Aug. 17-21, 1975.) Cardiology*, vol. 61, no. 1, 1976, p. 7-19. 19 refs. Grants No. NIH-H-3339; No. NIH-NB-07847; No. NIH-HL-16648.

Stimulation of sites in the midbrain reticular formation and in the posterior hypothalamus of the cat resulted in a large to modest rise of arterial pressure and the induction of cardiac arrhythmias. Most frequently, these arrhythmias developed upon cessation of brain stem stimulation but also occurred during the stimulus period in 5 of 23 cats studied. The arrhythmias disappeared upon cooling and reappeared upon rewarming the vagus nerves. The ventricular arrhythmias also were abolished by methylscopolamine, by bilateral vagatomy, or by extirpation of the stellate ganglia. Simultaneous stimulation of both distal end of the cut right vagus nerve and the decentralized right stellate ganglion caused arrhythmias similar to those observed after diencephalic stimulation. These data indicate that the cardiac arrhythmias evoked by brain stem stimulation result from the interplay of both sympathetic and parasympathetic influences on the heart. A schema is proposed of hypothalamic-medulla interaction as a central mechanism that may account for the development of ventricular arrhythmias. (Author)

A76-46688 **Automatic neural control of cardiac rhythm - The role of autonomic imbalance in the genesis of cardiac dysrhythmia.** W. C. Randall, D. E. Euler, H. K. Jacobs, W. Wehrmacher, M. P. Kaye, and G. R. Hageman (Loyola University, Maywood, Ill.). *(American Society for Pharmacology and Experimental Therapeutics, Symposium on the Importance of the Nervous System in the Initation and Treatment of Cardiac Arrhythmias, Davis, Calif., Aug. 17-21, 1975.) Cardiology*, vol. 61, no. 1, 1976, p. 20-36. 35 refs. Grants No. NIH-HL-08682; No. NIH-GM-00999.

A canine model has been developed in which the extrinsic innervation of the heart is ablated with the exception of the ventrolateral cardiac nerve. This nerve is distributed primarily to the inferior atrial, AV junctional, and ventricular tissues. Following recovery from surgery, the animal is placed on a treadmill and required to perform strenuous exercise. In all of six animals which sustained repeated exercise testing over periods of 4-12 months, dysrhythmias of varying complexities were elicited. None appeared in parallel experiments conducted in control or sham-operated animals. The dysrhythmias consisted of supraventricular, AV junctional, or ventricular tachycardias with occasional premature atrial or ventricular systoles. The dysrhythmias were not influenced by atropine but were generally controlled by propranolol. (Author)

A76-46689 **Neural basis for the genesis and control of arrhythmias associated with myocardial infarction.** K. M. Kent and S. E. Epstein (National Institutes of Health, National Heart and Lung Institute, Bethesda, Md.). *(American Society for Pharmacology and Experimental Therapeutics, Symposium on the Importance of the Nervous System in the Initation and Treatment of Cardiac Arrhythmias, Davis, Calif., Aug. 17-21, 1975.) Cardiology*, vol. 61, no. 1, 1976, p. 61-74. 26 refs.

Alterations of autonomic tone appear to have important effects on the electrical stability of the heart. Since altered electrical stability, ventricular fibrillation, is the cause of death in the majority of patients who die from ischemic heart disease, the effects of the autonomic nervous system on ventricular electrical stability have been examined. Increased vagal tone increases the electrical stability of the heart and reduces the incidence of spontaneous ventricular fibrillation after coronary occlusion. These salutary effects of increased cholinergic tone appear to be mediated by cholinergic innervation of the ventricular conducting system. Conversely, increased adrenergic tone decreases the electrical stability of the heart and increases the propensity of the heart to develop ventricular arrhythmias during coronary occlusion. The interaction of the adrenergic and cholinergic system during myocardial ischemia may be one of the important determinants of survival in patients with coronary artery disease and acute myocardial infarction. (Author)

A76-46716 **Evolution of the concepts of the origin of life, 1924-1974.** A. I. Oparin (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *(Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia,* Jan.-Feb. 1975, p. 5-10.) *Origins of Life*, vol. 7, Jan. 1976, p. 3-8. Translation.
(For abstract see issue 10, p. 1506, Accession no. A75-25598)

A76-46717 **Evolutionary oscillation in prebiology - Igneous activity and the origins of life.** P. C. Sylvester-Bradley (Leicester, University, Leicester, England). *(Akademiia Nauk SSSR, Mezhdunarodnyi Seminar o Proiskhozhdenii Zhizni, Moscow, USSR, Aug. 2-7, 1974.) Origins of Life*, vol. 7, Jan. 1976, p. 9-18. 35 refs.

The paper considers the questions of whether an oscillation between cold wet and hot dry environments, as is required by the volcanic theory for the origin of life, has parallels in other evolutionary environments and whether oscillation is a phenomenon general to all evolutionary change. The evolution of protocells is discussed in terms of the formation of a new system defined by a boundary and capable of begetting subsystems within itself. Three phases in the origin of life are proposed: (1) a phase in which various forms of molecular protolife are synthesized in a variety of environments characterized by a high energy flux and conditions far from equilibrium, (2) a phase in which protocells are formed and which seems to be restricted to an igneous environment, and (3) an assembly phase in which protocells evolve in a nutrient broth and which culminates in biopoesis. It is suggested that the oscillations in temperature and state of hydration which are necessary for the formation of protocells can be provided only by a volcanic environment. F.G.M.

A76-46718 * **Are the oldest 'fossils', fossils.** J. W. Schopf (California, University, Los Angeles, Calif.). *(Akademiia Nauk SSSR, Mezhdunarodnyi Seminar o Proiskhozhdenii Zhizni, Moscow, USSR, Aug. 2-7, 1974.) Origins of Life*, vol. 7, Jan. 1976, p. 19-36. 29 refs. NASA-supported research; NSF Grant No. GB-37257.

A comparative statistical study has been carried out on populations of modern algae, Precambrian algal microfossils, the 'organized elements' of the Orgueil carbonaceous meteorite, and the oldest microfossil-like objects now known (spheroidal bodies from the Fig Tree and Onverwacht Groups of the Swaziland Supergroup, South Africa). The distribution patterns exhibited by the more than 3000 m.y.-old Swaziland microstructures bear considerable resemblance to those of the abiotic 'organized elements' but differ rather markedly from those exhibited by younger, assuredly biogenic, populations. Based on these comparisons, it is concluded that the Swaziland spheroids could be, at least in part, of nonbiologic origin; these oldest known fossil-like microstructures should not be regarded as constituting firm evidence of Archean life. (Author)

A76-46720 * **The evolutionary significance of phase-separated microsystems.** S. W. Fox (Miami, University, Coral Gables, Fla.). *(Akademiia Nauk SSSR, Mezhdunarodnyi Seminar o Proiskhozhdenii Zhizni, Moscow, USSR, Aug. 2-7, 1974.) Origins of Life*, vol. 7, Jan. 1976, p. 49-68. 76 refs. Grant No. NGR-10-007-008.

The source, preparation, and properties of phase-separated systems such as lipid layers, coacervate droplets, sulphobes, and proteinoid microspheres are reviewed. These microsystems are of

interest as partial models for the cell and as partial or total models for the protocell. Conceptual benefits from the study of such models include clues to experiments on origins, insights into principles of action, and, in some instances, presumable models of the origin of the protocell. The benefits to evolution of organized chemical units are many, and can in part be analyzed. Ease of formation suggests that such units would have arisen early in primordial organic evolution. Integration of these various concepts and the results of consequent experiments have contributed to the developing theory of the origins of primordial and contemporary life. (Author)

A76-46721 * **Comment on Egami's concept of the evolution of nitrate respiration.** M. Rambler and L. Margulis (Boston University, Boston, Mass.). *Origins of Life*, vol. 7, Jan. 1976, p. 73, 74. 7 refs. Grant No. NGR-22-004-025.

Recent results suggest that the presence of common nitrogen salts (sodium nitrite and nitrate) in the irradiation medium can markedly protect filamentous blue-green algae from potentially lethal ultraviolet irradiation. The present results as well as general biological arguments of Egami support and extend Egami's original view that anaerobic respiratory pathways using nitrite and nitrate as terminal electron acceptors evolved prior to oxygen requiring aerobic respiratory pathways. (Author)

A76-46722 * **Chemical evolution and the origin of life Bibliography supplement 1974.** M. W. West, R. A. Koch (San Jose State University, San Jose, Calif.), and S. Chang (NASA, Ames Research Center, Moffett Field, Calif.). *Origins of Life*, vol. 7, Jan. 1976, p. 75-85. 215 refs. NASA-supported research.

A76-46790 **Induced electromagnetic field and absorbed power density inside a human torso.** K. M. Chen and B. S. Guru (Michigan State University, East Lansing, Mich.). *IEEE, Proceedings*, vol. 64, Sept. 1976, p. 1450-1453. NSF Grant No. ENG 74-12603.

The electric field and absorbed power density inside a typical human torso 1.7 m in height induced by EM waves with frequencies ranging from 10 to 500 MHz have been theoretically quantified. Some numerical examples are given. The strongest internal electric field and absorbed power was found to be induced by an EM wave of about 80 MHz with the incident electric field parallel to the torso height. (Author)

A76-46805 # **The effect of writing and reading habits and of handedness on the asymmetry of visual perception (Der Einfluss von Schreib- und Lesegewohnheiten sowie von Händigkeit auf die Asymmetrie der visuellen Wahrnehmung).** A. S. Cohen (Eidgenössische Technische Hochschule, Zurich, Switzerland). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, no. 3, 1976, p. 366-382. 24 refs. In German.

An investigation was conducted of the asymmetry of visual perception as a consequence of learning processes and the handedness of subjects. Results were compared for subjects from different populations, taking into account populations for which the direction of writing the native language differs. The subjects in this test were right-handed persons of Israeli and German origin. The performance of right-handed and left-handed persons selected from the same population was also compared. G.R.

A76-46806 # **Seven design methods for psychophysiological variables (Sieben Konstruktionsmethoden für psychophysiologische Variablen).** R. Guski (Physikalisch-Technische Bundesanstalt, Braunschweig, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, no. 3, 1976, p. 413-432. 22 refs. In German.

The sources of uncertainty with respect to the relations between psychological and physiological variables are examined and the methods for the design of reaction scores are considered. Attention is given to the law of initial values, the autonomic liability scores, and a comparison of differing design methods. A description is given of an experiment, involving a manual tracking problem, which was conducted with 400 subjects. The results of a statistical analysis of the test data are discussed, giving attention to the data provided by seven design methods for the psychophysiological variables. G.R.

A76-46807 # **The theoretical and experimental analysis of retroactive and ecphorical inhibition (Zur theoretischen und experimentellen Analyse der retroaktiven und ekphorischen Hemmung).** W. Hussy and A. von Eye (Trier, Universität, Trier, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, no. 3, 1976, p. 441-465. 42 refs. In German.

A description is presented of a test plan which makes it possible to determine experimentally the retroactive and ecphorical inhibition during investigations of learn and reproduction inhibition. Three classes of theories which can provide an explanation for the inhibition of the learning process are considered. The implementation of the proposed test plan is illustrated with the aid of an experimental study in which 90 students were used as subjects. G.R.

A76-46808 # **Effects on the information processing capacity which are obtained by taking into account the subjective organization (Die Beeinflussung der Informationsverarbeitungskapazität durch Berücksichtigung der subjektiven Organisation).** A. Zimmer (Regensburg, Universität, Regensburg, West Germany). *Zeitschrift für experimentelle und angewandte Psychologie*, vol. 23, no. 3, 1976, p. 521-529. 12 refs. In German.

A76-46809 **Red cell hemoglobin, hydrogen ion and electrolyte concentrations during exercise in trained and untrained subjects.** D. Böning, U. Tibes, and U. Schweigart (Deutsche Sporthochschule, Cologne, West Germany). *European Journal of Applied Physiology*, vol. 35, no. 4, 1976, p. 243-249. 21 refs. Research supported by the Bundesinstitut für Sportwissenschaften.

A76-46810 **Effect of physical fitness on vanillylmandelic acid excretion during immersion.** W. Skipka, D. Böning (Deutsche Sporthochschule, Cologne, West Germany), and K. A. Deck (Medizinische Klinik I, Cologne, West Germany). *European Journal of Applied Physiology*, vol. 35, no. 4, 1976, p. 271-276. 21 refs. Research supported by the Nordhein-Westfalen Ministerium für Wissenschaft und Forschung.

Experiments were conducted on 8 endurance-trained (TR) and 8 untrained (UT) male subjects to evaluate the effects of 4-6 hr head-out immersion on urinary excretion of vanillylmandelic acid (VMA), blood pressure, and plasma volume. Since adrenaline and noradrenaline are metabolized mainly to VMA, the excretion of VMA can be regarded as a decisive parameter of adrenaline and noradrenaline excretion and thus of sympathetic system activity. It is found that the increase in VMA is larger and statistically better confirmed for the UT than the TR group and that the plasma volume in the UT group is reduced while it remained constant in the TR group. The results suggest that orthostatic intolerance after immersion is not effected by decreased sympathetic innervation of vessels; it seems to be partly compensated for by an elevated sympathetic activity at least for the UT group. A decrease in renin activity might be a major cause for post-immersion orthostatic intolerance. S.D.

A76-46811 **Effect of training on the resting heart rate of rats.** R. J. Barnard, K. Corre, and H. Cho (California, University, Los Angeles, Calif.). *European Journal of Applied Physiology*, vol. 35, no. 4, 1976, p. 285-289. 18 refs. Grant No. PHS-HL-0052-01.

Results are presented for an experimental study on adult male rats trained progressively 5 days a week for 12 weeks on a motor-driven treadmill to assess the effect of training on neural influences related to the resting heart rate. Differences between the trained (N=8) and control (N=8) animals were compared statistically by the Student t test. It is shown that the bradycardia resulting from exercise training is due primarily to factors other than neural influences. Intrinsic changes in the heart itself probably in the sino-atrial node may be responsible for the observed bradycardia or an as yet unidentified humoral factor may be involved. The data also

suggest a small increase in parasympathetic tone and a small decrease in sympathetic tone. S.D.

A76-46812 * **Echocardiographic assessment of cardiac disease.** R. L. Popp (Stanford University, Stanford, Calif.). *Circulation*, vol. 54, Oct. 1976, p. 538-552. 63 refs. NASA-supported research; Grants No. NIH-HL-5866; No. NIH-1-K04-HL-70439; No. NIH-HL-14174.

The physical principles and current applications of echocardiography in assessment of heart diseases are reviewed. Technical considerations and unresolved points relative to the use of echocardiography in various disease states are stressed. The discussion covers normal mitral valve motion, mitral stenosis, aortic regurgitation, atrial masses, mitral valve prolapse, and idiopathic hypertrophic subaortic stenosis. Other topics concern tricuspic valve abnormalities, aortic valve disease, pulmonic valve, pericardial effusion, intraventricular septal motion, and left ventricular function. The application of echocardiography to congenital heart disease diagnosis is discussed along with promising ultrasonic imaging systems. The utility of echocardiography in quantitative evaluation of cardiac disease is demonstrated. S.D.

A76-46813 **Noninvasive assessment of mitral insufficiency by transcutaneous Doppler ultrasound.** P. M. Nichol, J. A. Persaud (University Hospital, London, Ontario, Canada), and D. R. Boughner. *Circulation*, vol. 54, Oct. 1976, p. 656-661. 14 refs. Research supported by the Ontario Heart Foundation.

A76-46855 **Physiological index - An aid in developing airline pilot scheduling patterns.** S. R. Mohler (FAA, Aeromedical Applications Div., Washington, D.C.). In: Managing safety; Proceedings of the Twenty-eighth International Air Safety Seminar, Amsterdam, Netherlands, November 2-6, 1975. (A76-46851 24-03) Arlington, Va., Flight Safety Foundation, Inc., 1975, p. 107-138. 10 refs.

A multiplicative and additive formula has been developed for assisting in the development of schedules for airline pilots and flight engineers. The formula is based on freshness/tiredness data derived from aircrews on world flights. It should materially assist those who develop the schedules to avoid, where possible, finalizing those crew patterns that would impose a severe physiologic load on cockpit personnel. The objective of the application of the formula is to assure that crew members retain adequate 'physiologic reserve' in the course of flying various segments of a pattern. This enables them to absorb the stresses of schedule delays or disruptions, as well as unforeseen operational problems and flight emergencies. (Author)

A76-46984 # **The relationship between the electrographic components of trace processes and the capacity of the short-duration memory of children and adults (O vzaimootnoshenii elektrograficheskikh komponentov sledovykh protsessov s ob'emom kratkovremennoi pamiati u detei i vzroslykh).** L. G. Voronin, N. M. Gromyko, and V. F. Konovalov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 21, 1976, p. 764-766. In Russian.

A76-47233 **Remote real-time parallel acquisition and analysis of noninvasive cardiac parameters using hybrid computer system.** R. L. Dooley, C. W. Malstrom, J. K. Bryan, B. W. Sauer (Clemson University, Clemson, S.C.), and W. P. Algary (Greenville Hospital System, Greenville, S.C.). In: Engineering in a changing economy; Proceedings of the Southeast Region 3 Conference, Clemson, S.C., April 5-7, 1976. (A76-47201 24-99) New York, Institute of Electrical and Electronics Engineers, Inc., 1976, p. 300-302. 5 refs. Research supported by the Medical Data Systems and Weston Instruments.

A76-47246 **Frequency dependence of regional lung clearance of Xe-133 in normal men.** R. S. Kronenberg, O. D. Wangensteen, and R. A. Ponto (Minnesota, University, Hospital, Minneapolis, Minn.). *Respiration Physiology*, vol. 27, Sept. 1976, p. 293-303. 12 refs. Research supported by the Minnesota Lung Association; Grants No. NIH-RR-267; No. NIH-5-K04-HL-70356.

A76-47247 **Effects of simulated altitude on O2 transport in dogs.** N. Banchero, S. H. Eby (Colorado, University, Denver, Colo.), M. Gimenez, and A. Rostami. *Respiration Physiology*, vol. 27, Sept. 1976, p. 305-321. 35 refs. Research supported by the World Health Organization; Grants No. PHS-HL-14317; No. PHS-HL-12679.

A76-47248 **Respiratory frequency control during hypercapnia in vagotomized, anesthetized cats.** R. Shannon (South Florida, University, Tampa, Fla.). *Respiration Physiology*, vol. 27, Sept. 1976, p. 357-367. 23 refs. NIH Grant No. 7-R01-HL-1771-05.

A76-47330 # **Metabolic effects of prolonged restriction of physical activity in rats.** H. Kaciuba-Uscilko, E. Pohoska, and S. Kozlowski (Polska Akademia Nauk, Centrum Badan Medycznych; Akademia Medyczna, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 3-8. 10 refs.

Investigations on the metabolic and hormonal consequences of prolonged immobilization of rats are summarized. The investigations revealed that during restriction of physical activity, the resting metabolic rate increases considerably and weight gains are markedly reduced. Physiological factors responsible for this unexpected phenomenon were studied, and adrenaline was found to be the hormone most involved. In the immobilized rats, increased diuresis and calcium excretion were found, and skeletal decalcification was noted. All the described changes, developing during prolonged restriction of physical activity, disappeared very slowly after returning the rats to the conditions of their normal physical activity. (Author)

A76-47331 # **Some metabolic and ionic responses during experimental immobilization.** Z. Kaleta, M. Grojec, and T. E. Wroblewski (Akademia Medyczna, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 9-14. 14 refs.

Experiments were carried out on rabbits exposed to experimental immobilization in special cages for 5 weeks. The BMR, SDA and PBI indices in blood serum were determined once a week. With increasing duration of immobilization, a gradual rise was observed in BMR as well as SDA values induced by orally administered glucose. The immobilization did not influence the level of PBI in blood serum or the sodium and potassium balances. (Author)

A76-47332 # **Effect of long-term hypodynamia and hypokinesia on the functional state and ultrastructure of striated muscles.** S. Baranski, Z. Edelwejn, and W. Stodolnik-Baranska (Wojskowy Instytut Medycyny Lotniczej; Akademia Medyczna, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 15-28. 15 refs.

Investigations were performed on rats after 6 months of hypokinesis and on pigeons after 1 year of hypodynamia. Changes in registered potentials in EMG, vacuolization of skeletal muscle-cell mitochondria in E/M after 3 months of hypokinesis, and degenerative changes of myofibrillum after 6 months of hypokinesis were found. No changes in cardiac muscle of rats were determined. After 1 year of hypodynamia, pigeon skeletal muscles were only slightly changed in the E/M picture. After hypokinesis and acceleration, a significant increase in the permeability of blood vessels was determined. Severe degeneration of mitochondrium and myofibrillum skeletal muscle after physical exercises in hypokinetic animals were observed. (Author)

A76-47333 # **Assessment of tolerance limits in subjects tested on human centrifuge.** M. Wojtkowiak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 29-35.

In routine tests on a human centrifuge, 500 men were investigated for determination of tolerance limits to the action of +Gz accelerations. The tests contained selected characteristic features of acceleration effects grouped in three programs. On the basis of the obtained results, scoring systems were proposed for each program, making possible selection of subjects suitable for flying as pilots. (Author)

A76-47334 # **The effect of sudden acceleration on certain organ-specific enzymatic reactions.** J. Moneta and P. Kapitan (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 37-45. 33 refs.

The reported investigations were carried out on 40 students. Group I (control) comprised 20 students subjected to sham ejection (without acceleration). In group II, another 20 students were subjected to ejection at 13-G acceleration. In the serum of all students, the activity of organ-specific enzymes - AlAT, AspAT, CPK and AP - was determined for checking the effect of emotion and acceleration on the activity of these enzymes. No statistically significant changes in the activity of these enzymes were observed after sham ejection and true ejection. In light of the obtained results it may be supposed that the emotional factor as well as 13-G acceleration during ejection training on the ground had no significant effect on the activity of these enzymes, which may suggest a lack of microtrauma development in the liver, striated muscles, and bones. (Author)

A76-47335 # **The influence of vibration on the human PHA stimulated lymphocytes in vitro.** W. Baranska (Akademia Medyczna, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 47-54. 13 refs.

Human peripheral lymphocytes were grown in vitro with phytohemagglutinin (PHA). Some cultures served as controls, the remaining were subjected to vibrations of changing parameters. The influence of various amplitudes and frequencies from 20 Hz to 70 Hz were investigated. Both control and experimental cultures were added to colcemid after 66 hrs of incubation. After 6 hrs, cultures were fixed, smears were stained, and the mitotic index and abnormal mitosis were analyzed. The results indicate that vibrations may increase the mitotic index and cause the appearance of various structural changes in chromosomes. The intensity of these phenomena depends on the parameters of vibration. (Author)

A76-47336 # **Effect of combined action of vibration and lumbar sympathectomy on changes in peripheral vascular bed of rat hindpaws.** W. Friedensberg (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 55-63.

Results are presented for radioisotope experiments performed on rats in order to determine the effect of vibration on the development of vascular changes in the lower extremities of pilots flyng propeller-driven aircraft. Experiments were performed on five groups of 12 rats each, including a control group, a group that underwent unilateral lumbar sympathectomy, a group exposed to vibration for 90 days after such sympathectomy, a group exposed to vibration but not operated upon, and a group subjected to the sympathectomy after long-term exposure to vibration. Changes in the vascular capacity of the animals during long-term exposure to vibration are studied, and the effect of unilateral lumbar sympathectomy on the vascular reactions caused by long-term vibration exposure are observed. It is found that: (1) rats exposed to vibration showed signs of ischaemia in the soft tissues of their footpads, (2) the capillaries of rats exposed to vibration contained no erythrocytes, (3) the capillaries and small veins of rats subjected to sympathectomy prior to vibration exposure were congested with blood, (4) the number of erythrocytes in the soft-tissue capillaries of the right hindpaws of rats subjected to right-sided sympathectomy prior to vibration exposure approached the number observed in the control group, and (5) the capillaries and small veins of rats exposed to vibration after right-sided sympathectomy contained no erythrocytes on the left side. F.G.M.

A76-47337 # **Effects of breathing air with increased carbon dioxide content on the human organism.** Z. Sarol, R. Bloszczynski, and Z. Dziuk (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 65-70. 9 refs.

The effects of breathing a gaseous mixture containing 7% CO_2 were studied with regard to the functions of the cardiovascular and respiratory systems and cognitive and psychomotor processes in man. The respiratory rate was found to increase to about 25/min, and the minute respiratory volume rose to 58 l. The changes observed in acid-base equilibrium had the character of decompensated gaseous acidosis and indicated accumulation of acid metabolites in the blood. The arterial blood pressure rose, especially the systolic one. Psychological testing demonstrated an increase in reaction time and narrowing of attention span. (Author)

A76-47338 # **Some aspects of chronobiology and their significance in aviation medicine.** K. Kwarecki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 71-83. 14 refs.

Problems concerning chronobiology and biorhythms are reviewed along with their relation to aerospace medicine and biology. The main groups of human biorhythms are identified, examples of each group are presented, and properties of selected human biorhythms are described. Studies of chronobiology in aviation medicine are discussed with reference to factors which may disturb the natural course of biorhythms in flight personnel. Effects of space flight on biorhythms are examined, particularly the effect of a lack of natural synchronizers in orbital and interplanetary space flights. It is shown that a catabolic effect of thyroid-gland hormones and glicocorticosteroids may be the reason for bone demineralization and changes in the characteristic structural and functional features of the muscle system during prolonged space flight. F.G.M.

A76-47339 # **Postradiation modification of drug action due to changes in distribution.** A. Danysz (Institute for Drugs Research and Control, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 85-91. 12 refs.

The purpose of this work was to study the correlation between postradiation changes in the action of chloropromazine and its brain-tissue concentration. It was found that fractional irradiation causes a decrease in chloropromazine action on the conditioned reflexes of rats. This effect is accompanied by a decrease of this agent's concentration in the brain. It was stated that there is no full correlation between these two processes. On this account, it should be assumed that in the irradiated animals, the pharmacological-effect changes are the consequence of at least two different processes, changes in the drug concentration in the effector tissue and modification of effector reactivity. In the case of chloropromazine, the most important process seems to be the modification of its distribution. (Author)

A76-47340 # **Emotional reactivity and motivation in pilots.** J. Terelak and R. Bloszczynski (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 93-102. 18 refs.

An empirical study was conducted to establish the relationship between job-motivation and emotional-reactivity levels in pilots. Three groups of pilots were tested: with a positive, a lowered, and a negative motivation. The tools were Taylor's Manifest Anxiety Scale, Eysenck's Personality Inventory (neuroticism), and Cattell's 16 Factor Personality Questionnaire (Factors C, L, O, and Q4). Significant differences were recorded in the emotional reactivity of pilots with a positive motivation as compared with those of a lowered motivation, and between pilots with a positive and negative motivation (P less than 0.01). The results indicate that a lowered and negative job motivation is accompanied by emotional disturbances in pilots. (Author)

A76-47341 # **Technical equipment and physicochemical parameters of culture of unicellular algae for ecologic closed systems.** J. Skrzypczyk (Slaska Akademia Medyczna, Katowice, Poland). *Artificial Satellites*, vol. 11, July 1976, p. 103-113. 32 refs.

The paper discusses the effect of various physicochemical parameters such as light, temperature, carbon dioxide concentration, pH, intensity of culture mixing, and quantitative and qualitative composition of mineral media on cultures of algae. The results of experimental investigations with cultures of Chlorella in a culture reactor are presented. (Author)

A76-47398 # **On optimality in human control tasks.** S. J. Merhav (Technion - Israel Institute of Technology, Haifa, Israel). *International Council of the Aeronautical Sciences, Congress, 10th, Ottawa, Canada, Oct. 3-8, 1976, Paper 76-54*. 14 p. 25 refs.

Man-machine modeling in aircraft control is analyzed for two problems: lateral control of a low flying vehicle using basic visual field cues, and control performance using a manipulator which provide the operator with complete kinesthetic information on the controlled plant. An analytical model is presented which is derived from the optimization of a quadratic performance criterion and the linearized equations of motion describing the lateral control of a low-flying remotely controlled vehicle. Comparison between experiment and theory strongly supports the hypothesis that a trained operator acts as an optimal controller. The approach of optimal control in man-machine research holds promise with regard to the theoretical development of this area and improved designs for man-machine interfaces both at the display and the control level. S.D.

A76-47476 **A 15-electrode totally implanted time-multiplex telemetry unit.** S. Deutsch (Rutgers University, Piscataway, N.J.). *(American Conference on Engineering in Medicine and Biology, 28th, New Orleans, La., Sept. 20-24, 1975.) IEEE Transactions on Communications*, vol. COM-24, Oct. 1976, p. 1073-1078. 12 refs. Research supported by the Rutgers University; Contract No. N00014-76-C-0241.

A low-noise time-multiplex biotelemeter powered by two mercury cells in series (2.7 V) is designed to handle signals picked up by relatively gross extracellular electrodes (up to 2 mV peak) embedded in brain or heart tissue. Magnetic turn-off to conserve battery power is combined with rf turn-on. Batteries operate 100 h without replacement, and weight is 41 g. The research goal is an integrated EEG activity picture, either in widely separated regions (as in the case of bilateral symmetry) or in a local region (such as visual or auditory cortex), in socially interacting epileptic monkeys. The animals with the biotelemeter implanted are fully ambulatory, and only a slight protuberance betrays the presence of the transmitter. The unit is adjusted for 75 kHz peak deviation of a 20 MHz carrier at 5 mV peak channel input. R.D.V.

A76-47548 **The organic chemistry and biology of the atmosphere of the planet Jupiter.** C. Ponnamperuma (Maryland, University, College Park, Md.). *(IAU, NASA, and NSF, Jupiter Colloquium, 30th, Tucson, Ariz., May 18-23, 1975.) Icarus*, vol. 29, Oct. 1976, p. 321-328. 31 refs.

In order to understand the chemical processes which may be taking place in the Jovian atmosphere, we have conducted a number of simulation experiments in the laboratory. These reactions appear to be significant for our understanding of chemical evolution and the nature and origin of organic matter in the universe. Mixtures of methane and ammonia in varying proportions have been exposed to electric discharges and the products analyzed. We have found that, as the methane and ammonia disappear, hydrogen cyanide and acetylene are to be built up. The analysis of the volatiles has also provided us with a wide range of aminonitriles. It is conceivable that some of these nitriles, on hydrolysis, will give rise to amino acids. On cyclization, some of them would provide the pathways for the origin of pyrimidines. A characteristic result of these reactions has also been the appearance of a red polymer which may have a bearing on the color in the red spots of Jupiter. Spectral analysis in the laboratory may provide some clues in our search for organic material in the Jovian atmosphere by orbiting spacecraft, or ground-based observations. (Author)

A76-47549 **Jackrabbit ears - Surface temperatures and vascular responses.** R. W. Hill (Michigan State University, East Lansing, Mich.) and J. H. Veghte (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Science*, vol. 194, Oct. 22, 1976, p. 436-438. 5 refs.

Blood flow to the ear pinnae of jackrabbits is curtailed at ambient temperatures between 1.4 and 24.0 C, which minimizes heat loss across the pinnae and allows the surfaces of erect pinnae to approach ambient temperature. The pinnae are warmed by steady or pulsatile vasodilation in some animals when the ambient temperature is between 1 and 9 C below body temperature, a response favoring heat loss. When ambient temperature exceeds body temperature by 4 to 5 C, the pinnae are circulated with blood cooler than ambient temperature; this response favors heat influx. (Author)

A76-47721 * **Mechanisms of radio-protection by catecholamines in the hamster /Mesocricetus auratus/.** R. L. Prewitt and X. J. Musacchia (Missouri, University, Columbia, Mo.). *International Journal of Radiation Biology*, vol. 27, no. 2, 1975, p. 181-191. 22 refs. Grants No. PHS-GM-41418-03; No. NGL-26-004-021.

Experiments were conducted on normal and splenectomized male and female hamsters between 2 and 3 months old subjected to a whole-body exposure of 1000 or 2000 rads in a Co-60 source with a view toward evaluating their radio-protection by norepinephrine, isoproterenol, and phenylephrine. Vasoconstriction hypoxia mechanism of radio-protection is examined along with the hypothesis that isoproterenol protects by hypercalcemia-induced cell proliferation. Radiation experiment results are found to be consistent with the hypothesis that stimulation of alpha receptors results in radio-protection through a tissue hypoxia mechanism. Beta agonists seem to protect by a hypotensive-hypoxia mechanism. The catecholamines protect against the hematopoietic syndrome, but show no evidence of protection against the gastrointestinal syndrome. S.D.

A76-47737 **The influence of CSF calcium and magnesium on the ventilatory response to carbon dioxide during hyperoxia.** A. Berkenbosch, P. H. Quanjer, J. de Goede, and G. J. Tammeling (Leiden, Rijksuniversiteit, Leiden, Netherlands). *Pflügers Archiv*, vol. 365, no. 2-3, 1976, p. 151-157. 14 refs.

A76-47738 **Circadian rhythms of rat internal temperatures and thermal ambiance (Rythmes circadiens des températures internes et ambiance thermique chez le rat).** B. Roussel, G. Chouvet, and G. Debilly (Service de Santé de l'Armée, Centre de Recherches; Lyon I, Université, Lyons, France). *Pflügers Archiv*, vol. 365, no. 2-3, 1976, p. 183-189. 32 refs. In French. Research supported by the Institut National de la Santé et de la Recherche Médicale; Direction des Recherches et Moyens d'Essais Contracts No. 74/013; No. 74/025; Service de Santé de l'Armée Contract No. OUR-93/7/01; Centre National de la Recherche Scientifique Contract No. LA/162.

Cerebellar and subcutaneous temperatures were recorded in rats which were maintained at different ambient temperatures in a 12 h light-dark cycle. It was found that the cerebellar and subcutaneous temperatures followed a rhythm with a period of 24 h. Each elevation of the ambient temperature produced a rise in the mean internal temperature of the rat. This elevation of temperature was maintained for the duration of the 10 days of observation. G.R.

A76-47739 **Renal hemodynamics and renal O2 uptake during hypoxia in the anesthetized rabbit.** E. Bursaux, C. Poyart, and B. Bohn (Institut National de la Santé et de la Recherche Médicale, Suresnes, Hauts-de-Seine, France). *Pflügers Archiv*, vol. 365, no. 2-3, 1976, p. 213-220. 33 refs. Research supported by the Institut de la Santé et de la Recherche Médicale.

A76-47740 **Comparison of shivering in man exposed to cold in water and in air.** J. Timbal, C. Boutelier, M. Loncle, and L. Bougues (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Bretigny-sur-Orge, Essonne, France). *Pflügers Archiv*, vol. 365, no. 2-3, 1976, p. 243-248. 24 refs.

A76-47741 * **Acquisition of quantitative physiological data and computerized image reconstruction using a single scan TV system.** N. A. Baily (California, University, La Jolla, Calif.). In: Conference on Cardiovascular Imaging and Image Processing: Theory and Practice - 1975, Stanford University, Stanford, Calif., July 10-12, 1975, Proceedings. Conference sponsored by Stanford University and NASA. Palos Verdes Estates, Calif., Society of Photo-Optical Instrumentation Engineers (SPIE Proceedings. Volume 72), 1976, p. 149-156. 18 refs. Grants No. NGR-05-009-257; No. PHS-1-P17-HL-14169.

A single-scan radiography system has been interfaced to a minicomputer, and the combined system has been used with a variety of fluoroscopic systems and image intensifiers available in clinical facilities. The system's response range is analyzed, and several applications are described. These include determination of the gray scale for typical X-ray-fluoroscopic-television chains, measurement of gallstone volume in patients, localization of markers or other small anatomical features, determinations of organ areas and volumes, computer reconstruction of tomographic sections of organs in motion, and computer reconstruction of transverse axial body sections from fluoroscopic images. It is concluded that this type of system combined with a minimum of statistical processing shows excellent capabilities for delineating small changes in differential X-ray attenuation. F.G.M.

A76-47774 **Effects remaining after withdrawal of long-term beta-receptor blockade - Reduced heart rate and altered haemodynamic response to acute propranolol administration.** T. Brundin, O. Edhag, and T. Lundman (Serafimer Hospital, Stockholm, Sweden). *British Heart Journal*, vol. 38, Oct. 1976, p. 1065-1072. 26 refs. Research supported by the Swedish Association against Heart and Chest Diseases, Stiftelsen Lars Hiertas Minne, Carl Yngve Johnson's Foundation, Wessens Foundation, and ICI-Pharma AB.

A76-47900 # **Dynamics of the phase asymmetry of the fundamental EEG rhythm under conditions of short-term memory of verbal information (Dinamika asimmetrii faz osnovnogo ritma EEG v usloviiakh kratkovremennogo zapominaniia verbal'noi informatsii).** G. A. Aminev (Ufimskii Aviatsionnyi Institut, Ufa, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 11, 1976, p. 507-509. 7 refs. In Russian.

A76-47907 **Serial measurements of left ventricular ejection fraction by radionuclide angiography early and late after myocardial infarction.** H. R. Schelbert, H. Henning, W. L. Ashburn, J. W. Verba, J. S. Karliner (California, University, Medical Center, San Diego, Calif.), and R. A. O'Rourke. *American Journal of Cardiology*, vol. 38, Oct. 1976, p. 407-415. 41 refs. Grants No. NIH-NO1-HV-81332; No. NIH-HL-14197.

The left ventricular ejection fraction was determined serially with radioisotope angiography in 63 patients with acute myocardial infarction. After the peripheral injection of a bolus of technetium-99 m, precordial radioactivity was recorded with a gamma scintillation camera and the ejection fraction calculated from the high frequency left ventricular time-activity curve. Late follow-up serial studies were also performed in an additional 13 patients who had only one measurement of the left ventricular ejection fraction during the early postinfarction period. Patients with an initially low or decreasing ejection fraction had a significantly greater incidence of early mortality and left ventricular dysfunction (probability less than 0.02) than those whose ejection fraction was normal or improved to normal early after infarction. The results indicate that the ejection fraction is a sensitive indicator of left ventricular function after acute myocardial infarction and that serial measurements are helpful in predicting early mortality and morbidity. (Author)

A76-47908 **Noninvasive myocardial imaging with potassium-43 and rubidium-81 in patients with left bundle branch block.** R. L. McGowan, T. G. Welch, B. L. Zaret, A. L. Bryson, N. D. Martin, and M. D. Flamm (USAF, Travis AFB, Calif.). *American Journal of Cardiology*, vol. 38, Oct. 1976, p. 422-428. 22 refs. USAF-supported research.

A76-47909 **Computer detection of premature ventricular complexes - A modified approach.** S. B. Knoebel, D. E. Lovelace (Indiana, University, Indianapolis, Ind.), S. Rasmussen (Purdue University, Lafayette, Ind.), and S. E. Wash (U.S. Veterans Administration Hospital, Indianapolis, Ind.). *American Journal of Cardiology*, vol. 38, Oct. 1976, p. 440-447. 17 refs. Research supported by the Herman C. Krannert Fund and U.S. Veterans Administration Hospital; Grants No. NIH-HL-06308; No. NIH-HL-05363; No. NIH-HL-05749.

Results are presented for an experiment with a modified computer system in detecting premature ventricular complexes evaluated in continuous tape records of 30 patients in a coronary care unit. A decision table based on QRS configuration, T wave configuration, and timing is used to classify 4 types of QRS complexes: normal, premature ventricular, interpolated or late ventricular, and atrial premature. The observed basic cardiac rhythms were normal sinus, sinus arrhythmia, sinus tachycardia, atrial fibrillation, atrioventricular dissociation with first- and second-degree heart block, and demand pacemaker rhythm. The system has the major advantage of updating itself every 100 complexes, so that changes in normal configuration with patient movement, intermittent burdle branch block, sinus arrhythmia, and the wide variation in QRS configuration and timing concomitant with atrial fibrillation are less likely to result in false positive identification of premature ventricular complexes. Less than 2% false negative and 3% false positive rate of identification of premature ventricular complexes is ultimately determined. S.D.

A76-47924 # **Ventilatory responses to CO2 rebreathing at rest and during exercise in untrained subjects and athletes.** M. Miyamura, T. Yamashina, and Y. Honda (Kanazawa University, Kanazawa, Japan). *Japanese Journal of Physiology*, vol. 26, no. 3, 1976, p. 245-254. 25 refs.

Experiments were conducted on 10 marathon runners aged 19-26 yr and 14 untrained subjects aged 20-33 yr to study ventilatory responses to CO2 during rest and exercise using the rebreathing method. It is found that the slopes of the minute ventilation versus alveolar carbon dioxide tension curves for athletes both at rest and during exercise are lower than those for the untrained subjects (probability less than 0.05). This decrease in the ventilatory response curves for athletes is likely to be due to diminished peripheral chemoreceptor function as described by Byrne-Quinn et al., (1971). It is concluded that the observed differences in the minute ventilation versus alveolar carbon dioxide tension curves between the athlete and untrained groups may be due to a reduced gain in the ventilatory output from the respiratory centers and/or by a reduced input signal. S.D.

STAR ENTRIES

N76-32362 Michigan Univ., Ann Arbor. Highway Safety Research Inst.
SIMULATION OF HUMAN BODY RESPONSE TO CRASH LOADS
D. H. Robbins *In* Shock and Vibration Information Center Shock and Vibration Computer Programs 1975 p 365-380 refs (For

Computer programs which simulate human body response to crash loads are described. These simulations are adapted to the study of aircraft occupants, pedestrians, cyclists, and automobile occupants. These programs are compared in terms of (1) sources of documentation, information, and contacts for obtaining the programs, (2) parameters defining the crash victim, (3) the means by which forces are transmitted to the victim, and (4) the acceleration or other kinematic inputs which force a dynamic interaction between the environment and the victim.
Author

N76-32822 Purdue Univ., Lafayette, Ind.
A MATHEMATICAL THEORY OF GROWTH PROCESSES AND MECHANICAL BEHAVIOR OF BIOLOGICAL MATERIALS Ph.D. Thesis
Prakash Hore 1975 150 p
Avail: Univ. Microfilms Order No. 76-20450

The fundamental relations for field and constitutive equations were developed for a growing biomaterial which is composed of different species. Various concepts in continuum mechanics, thermodynamics, and biochemical kinetics were used. A mathematical formalism was presented, and focused on the behavior of general viscoelastic materials with applications to such problems as the influence of stresses, concentration, and temperature fields on the growth of biosolids, e.g., growth of bones, and the chemotherapeutic treatment of a tumor. Extension was also indicated to the case of biofluids, with applications to such problems as the control of abnormal growth of cellular constituents in a fluid, e.g., chemotherapy of leukemia.
Dissert. Abstr.

N76-32823# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE SILICON COMPONENT IN LIVING CELLS AND ORGANISMS
W. Sedlak 1976 14 p refs Transl. into ENGLISH from Kosmos. Ser. A (Warsaw), v. 12, no. 6, 1963 p 497-504
(NRC/CNR-TT-1879; ISSN-0077-5606) Avail: NTIS HC $3.50

Biological aspects of silicon are discussed. Silicosis and the silico-arthritic syndrome of Caplan are discussed along with the silicon content of the blood, brain, and skin. It is suggested that the primeval life was based on silicon compounds. Later, carbon supplanted the silicon.
F.O.S.

N76-32824*# Hardin-Simmons Univ., Abilene, Tex. Science Research Center.
RESPONSE OF SELECTED MICROORGANISMS TO EXPERIMENTAL PLANETARY ENVIRONMENTS Semiannual Progress Report, 1 Jan. - 30 Jun. 1976
Terry L. Foster and Luther Winans, Jr. Aug. 1976 37 p
(Grant NGR-44-095-001)
(NASA-CR-148833; SAPR-8) Avail: NTIS HC $4.00 CSCL 06M

Results are presented on the anaerobic conversion of phosphite to phosphate. It is demonstrated that in the presence of both phosphite and hypophosphite, the phosphite is the preferred phosphorous source. An investigation in which P-32 labeled hypophosphite was added to the basal medium demonstrates that the labeled hypophosphite was incorporated into the metabolic reactions of the cell. Other data show that as cell growth occurs, the phosphite and/or hypophosphite levels decrease. The Bacillus sp. capable of anaerobic utilization of phosphite was isolated from Cape Canaveral soil samples, and it is partially characterized. Also included are continued investigations of omnitherms. The data presented show that some of these possess significant resistance to the Viking dry-heat cycle, and that they retain their omnithermic characteristic after recovery from the heat cycle. Other physiological characteristics of these isolates are also presented. It is demonstrated that omnitherms can be isolated from Cape Canaveral soil.
Author

N76-32825*# Transemantics, Inc., Washington, D.C.
PLANT GROWTH AND DEVELOPMENT UNDER CONDITIONS SIMULATING WEIGHTLESSNESS
A. I. Merkis, R. S. Laurinavichyus, O. Yu. Rupaynene, and E. K. Savichene Sep. 1976 11 p refs Transl. into ENGLISH from Doklady Akademii Nauk SSSR (USSR), vol. 226, no. 4, Feb. 1976 p 978-981
(Contract NASw-2792)
(NASA-TT-F-17214) Avail: NTIS HC $3.50 CSCL 06C

The effect of weightlessness on growth and development was studied in Arabidopsis thaliana (L.) Heynh and Chenopodium rubrum L. The plants were grown in a sterile tube culture on an agar nutrient medium. They were grown in the center of a clinostat, the rotation period of which was 21 sec. The force of gravity for the plants more remote from the center did not exceed 6.8 .00001g. Twenty-four-hour illumination was provided. The Arabidopsis thaliana completed the entire growth cycle in 35 - 37 days, and the Chenopodium rubrum - in 100 - 110 days. The results show that weightlessness did not affect significantly the seed germination. A noticeable deviation was root growth orientation: one part of the roots grew deeper into the nutrient medium, while the other crept along the agar surface. As the growing process progressed, the effect of weightlessness became more pronounced. Results also indicate that plant growth and morphogenesis were disturbed during weightlessness in the later stages of their development.
Author

N76-32826# Texas Univ., San Antonio.
GROWTH AND DEVELOPMENT OF NEONATAL MICE EXPOSED TO HIGH-FREQUENCY ELECTROMAGNETIC FIELDS Final Report, Feb. 1974 - Feb. 1975
William B. Stavinoha, Arvin Modak, Miguel A. Medina, and Arthur E. Gass Dec. 1975 12 p refs
(Contract F41609-74-C-0018; AF Proj. 7757)
(AD-A022765; SAM-TR-75-51) Avail: NTIS CSCL 06/18

Four-day-old mice were exposed to high-frequency electromagnetic radiation. Growth rate was followed for up to 16 weeks of age. No effect of irradiation on the growth and development of these neonatal mice was evident.
GRA

N76-32827# Witwatersrand Univ., Johannesburg (South Africa). School of Mechanical Engineering.
MEASUREMENTS OF THE TEMPERATURE PROFILES IN THE FOREARM SKIN OF A NUDE RESTING SUBJECT EXPOSED TO A RANGE OF THERMALLY NEUTRAL ENVIRONMENTS
A. M. Patterson Mar. 1976 86 p refs
(ISBN-0-85494-371-4; Rept-66) Avail: NTIS HC $5.00

Reliable measurements of temperature profiles in the first 2 to 3 mm depth of skin are obtained on the forearm of a nude subject at rest in environments ranging from 24 C to 34 C dry bulk temperature. Resolutions in temperature and depth were typically 0.02 K and 0.04 mm and great care was taken to avoid transient effects. The profiles obtained have a dog-leg appearance with a sharp change in gradient at about 1 mm depth. The change in slope represents either a change in heat flux, or thermal conductivity, or both, and is a feature of a model of the thermal role of blood flow in skin to be published.
Author

N76-32828# Army Aeromedical Research Lab., Fort Rucker, Ala.
STUDIES OF VISUAL DISORIENTATION. 1: PERCEIVED STABILITY OF THE VISUAL WORLD DURING SACCADIC EYE MOVEMENTS
Franklin F. Holly 16 Apr. 1976 7 p Presented at Southern Soc. for Philosophy and Psychol., Atlanta, 16 Apr. 1976
(AD-A023599) Avail: NTIS CSCL 05/10

It is shown that the most commonly accepted version of the extraretinal signal leads to a paradox. A possible resolution of this paradox is presented. It was also found that a moving stimulus which is present for a portion of a saccade and which moves at approximately the same velocity as the eyes will, in most cases, not produce any disorientation. However, it will lead to an erroneous perception of that stimulus. GRA

N76-32829# Presbyterian-Pennsylvania Univ. Medical Center, Philadelphia.
BIOCHEMICAL CHANGES IN NAVAL AIRCREWMEN CAUSED BY STRESS IN FLIGHT PERFORMANCE Progress Report
B. F. Burgess May 1973 7 p
(Contract N62269-73-C-0571)
(AD-A020277) Avail: NTIS CSCL 06/1

The pilot study indicates that the excretion of o-hydroxy hippuric acid in urine is a useful addendum to the molecular determinants of stress and, under controlled conditions, may aid in identifying candidates who can or cannot succeed as test parachutists. In concurrent experiments all parachutists studied showed a significant increase in plasma phosphatidyl glycerol, a sensitive and proven indicator for stress. Further studies have shown that the distribution of cyclic AMP in living tissues is ubiquitous and that increased tissue levels are associated with beta adrenergic reactions. It was postulated that changes in tissue cyclic AMP levels might be correlated with physiological changes resulting from the application of whole body stresses, and that tissue cycle AMP could be used as an indicator of physiological stress. GRA

N76-32830# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PULSE PRESSURE AND PULSE RATE AS INDICES OF CARDIAC OUTPUT
Y. Asawa 6 Jan. 1976 20 p refs Transl. into ENGLISH from Japan. J. Anesthesiology (Japan), v. 18, 1969 p 1115-1123
(AD-A020460; FTD-ID(RS)I-2417-75) Avail: NTIS CSCL 06/5

If cardiac output could not be measured directly, it might be inferred from vital signs readily obtained clinically. The present study is an attempt to see whether such an estimation is possible. The Cardiac output per minute (C. o(m)) is obtained by Stroke volume (ml) X Heart rate (per minute). The heart rate could be obtained readily. Thus if the variation of Stroke volume (s.v.) could be estimated, then the variation of cardiac output per minute (C. o(m)) will be estimated. While exact statements cannot be made on the changes in stroke volume unless one knows the extensibility and calibre of the blood vessel, one can obtain the expected change of stroke volume from the age-specific degree of vascular extensibility derived statistically. GRA

N76-32831# Dayton Univ. Research Inst., Ohio.
BONE STRENGTH AND IN-FLIGHT MECHANICAL STRESSES Final Scientific Report
G. A. Graves, P. K. Bajpai, D. E. McCullum, and H. G. Stein 29 Aug. 1975 269 p refs
(Contract F44620-71-C-0083; AF Proj. 9777)
(AD-A020531; AFOSR-76-0039TR) Avail: NTIS CSCL 06/5

A series of experiments were designed and implemented to provide data concerning the effect of restorable calcium aluminate ceramic implants on new bone growth in the local area of the implant, and in in vivo biochemical responses. Rhesus monkeys were used as hosts for the implants in the form of total or partial circumferential replacement of femur sections. Radiographic and biochemical analyses were obtained. Standard histological, scanning electron and light microscopy, light energy dispersive analysis, and electron-microprobe techniques were used in analyses of ceramic-bone specimens. Detailed results are compared to analysis of ceramic compositions and microstructures prior to implantation. Author (GRA)

N76-32832# Army Aeromedical Research Lab., Fort Rucker, Ala.
BLOOD PRESSURE MEASUREMENT IN A HIGH NOISE ENVIRONMENT, SELECT BIBLIOGRAPHY OF BOOKS, JOURNAL ARTICLES AND DOCUMENTS, 1963 - 1975
Sybil H. Bullock Jan. 1976 12 p refs
(AD-A021203; USAARL-Special-Bib-Ser-6) Avail: NTIS CSCL 06/12

Titles of books, journal articles, and documents are included in this select bibliography on blood pressure measurement in a high noise environment. Subjects covered include ultrasonics, automated and digital read-out devices for determining blood pressure. GRA

N76-32833# Naval Submarine Medical Research Lab., Groton, Conn.
THE EFFECT OF COMMON THERAPEUTIC DRUGS ON VISION Interim Report
S. M. Luria, Helen M. Paulson, Jo Ann S. Kinney, Christine L. McKay, and Mark S. Strauss 1 May 1975 69 p refs
(AD-A020346; NSMRL-808) Avail: NTIS CSCL 06/15

One therapeutic dose of five widely-used medicinal drugs (Aralen, Benadryl, Dexedrine, Digoxin, and Valium) was administered to 36 subjects. Measurements were made of the effects of the drugs on pupil size, intraocular pressure and the fundus, various aspects of color vision, the electrical activity of the brain, eye-movements and stereoacuity. A number of significant changes were observed despite the small size of the dosage and the number of subjects. The practical implications of the findings are discussed, as well as the value of visual psychophysical tests of pharmacological intoxication. Author (GRA)

N76-32834# Office of Naval Research, London (England).
INTERDISCIPLINARY APPROACHES IN SCIENCE: BIOELECTROCHEMISTRY AND BIORHEOLOGY AS NEW DEVELOPMENTS IN PHYSIOLOGY
Martin Blank 23 Jul. 1975 24 p
(AD-A013781; ONRL-12-75) Avail: NTIS CSCL 06/16

As science has developed into a more highly organized and automated activity, it appears to have changed in ways that have affected its traditional patterns of development. To overcome the constraints imposed by the new organization, scientists have formed interdisciplinary research areas as a creative way of approaching complex problems: this report reviews interdisciplinary research in general and two new areas that are developing in western europe, bioelectrochemistry and biorheology. GRA

N76-32835# Army Materiel Command, Texarkana, Tex. Intern Training Center.
PUPIL RECOVERY VERSUS BANDWIDTH/INTENSITY OF THE VISIBLE SPECTRUM Final Report
Brian W. Durtschi Dec. 1975 64 p refs
(AD-A020502; USAMC-ITC-02-08-76-401) Avail: NTIS CSCL 06/16

This research experiment was performed to investigate possible differences in pupil recovery times as the result of a light stimulus of separate visible bandwidths and intensities of the electromagnetic spectrum. An experiment was designed using dual intensity (10 and 20 foot candles) light of three separate bandwidths of the visible spectrum to measure the time of 50% pupil recovery from a constricted state. Twelve caucasian males with uncorrected normal vision were chosen as subjects for this experiment. Subjects were dark adapted to a very low (less than one foot candle) red (approximately 700 nm) light source. The pupil constriction-dilation sequence was initiated by a projected light of one of the two intensities and bandwidths of either 400-425 nm (blue), 500-520 nm (green), or 650-700 nm (red). This procedure provided 72 data points from a three variable-two level, randomized block factorial-fixed effect design. The parameter or data point of interest was the time of pupil recovery to a 50% redilation level following constriction. The

data point was taken from measurements of pupil movement recorded on a series 800 Space Sciences TV Pupillometer. Conclusions drawn from the analysis are as follows: (1) The wavelength of a light stimulus affects pupil recovery times. (2) Higher intensities of a given wavelength light cause faster pupil recovery times. Author (GRA)

N76-32836# Utah Univ., Salt Lake City. Dept. of Bioengineering.

COMPARISON OF THEORETICAL AND EXPERIMENTAL ABSORPTION OF RADIO FREQUENCY POWER

Stewart J. Allen, Carl H. Durney, Curtis C. Johnson, and Habib Massoudi Dec. 1975 20 p refs

(Contract F41609-75-C-0022; AF Proj. 7757)

(AD-A022890; SAM-TR-75-52) Avail: NTIS CSCL 06/18

Power absorption calculations were performed for radiofrequency exposures (10-50 MHz) using prolate spheroid models, and these data were compared with experimental data obtained from prolate spheroid monkey and human phantoms, and live monkeys. Agreement of spheroid calculations with empirical spheroid data was excellent; however, it was found that ellipsoid models better approximate monkeys and humans. Author (GRA)

N76-32837# Washington Univ., Seattle. Electromagnetics Research Lab.

EFFECTS OF ELECTROMAGNETIC FIELDS ON THE NERVOUS SYSTEM

Chung-Kwang Chou and Arthur W. Guy Aug. 1975 132 p refs

(Contract N00014-75-C-0464; Grant NSF GK-34730; NR Proj. 201-054)

(AD-A022462; SR-6) Avail: NTIS CSCL 06/18

Contents: Electromagnetic Field-Biomaterial Interaction and Methods of Measurement; Effects of Electromagnetic Fields on Isolated Nerves and Superior Cervical Ganglia: Design of Waveguide Apparatus, and Calculation of Specific Absorption Rate; Effects of Electromagnetic Fields on Muscle Contraction; Effects of Electromagnetic Fields on Auditory System: Effect of Noise Masking on Threshold of Evoked Auditory Responses, Microwave-induced Cochlear Microphonics in Guinea Pigs. GRA

N76-32838# Army Research Inst. of Environmental Medicine, Natick, Mass.

THE AMELIORATION OF ACUTE MOUNTAIN SICKNESS BY STAGING AND ACETAZOLAMIDE

W. O. Evans, S. M. Robinson, D. H. Horstman, R. E. Jackson, and R. B. Weiskopf May 1975 27 p refs

(DA Proj. 3A7-62758-A-827)

(AD-A019592; USARIEM-M-36-75) Avail: NTIS CSCL 06/19

Treatment by four days residence at 1600M plus the administration of 500mg acetazolamide twice a day for the last two days at 1600M and the first two days at 4300M was compared with no treatment prior to ascent to 4300M for prophylaxis of acute mountain sickness. The treatment successfully prevented almost all symptoms of acute mountain sickness. It had no effect on the diminished capacity for maximal or prolonged heavy physical work. The treatment produced a relative acidosis and a comparatively greater arterial oxygen tension at 4300M. Author

N76-32839# Naval Submarine Medical Research Lab., Groton, Conn.

VISUAL EVOKED RESPONSES AND EEGS FOR DIVERS BREATHING HYPERBARIC AIR: AN ASSESSMENT OF INDIVIDUAL DIFFERENCES

Jo Ann S. Kinney, Christine L. McKay, and S. M. Luria 3 Jun. 1975 20 p refs

(MF51524004)

(AD-A020335; NSMRL-809) Avail: NTIS CSCL 06/19

In order to assess individual differences in susceptibility to nitrogen narcosis, a group of 16 men made repeated air dives to approximately 200 ft in a pressure chamber. The visual evoked response of the men at this depth revealed several decrements - in the response to a slow rate of stimulation, there was a highly significant reduction in a component around 160 msec in the response to a rapid rate of stimulation, marked losses in amplitude and increases in variability were found. The latter changes were related to diving experience while the former were not. No significant changes were found in alpha or theta activity in the EEG. Author (GRA)

N76-32840# Army Materiel Command, Texarkana, Tex. Intern Training Center.

PROPOSED REVISIONS TO ANSI STANDARD C95.1 FOR EXPOSURE TO RADIO FREQUENCY AND MICROWAVE RADIATIONS Ph.D. Thesis. Final Report

James A. Wellsand Nov. 1975 69 p refs

(AD-A020681; USAMC-ITC-02-08-76-410) Avail: NTIS CSCL 06/18

The paper reviews the biological effects resulting from exposure to radio frequency and microwave radiations. The controversy over the relevance of the thermal and nonthermal effects is resolved in the light of present research findings. The quality of ANSI C95.1--Safety Level of Electromagnetic Radiation with Respect to Personnel--is examined. The basic conclusion is that the current guide number is acceptable. Proposals to improve the standard in other ways are made based on recent research. GRA

N76-32841# Army Nuclear Agency, Fort Bliss, Tex.

THE CALCULATION OF ABSORBED DOSE AND TISSUE TRANSMISSION FACTORS

A. S. Warshawsky 11 Nov. 1974 20 p refs

(AD-A012684; NUA-TM-1-74) Avail: NTIS CSCL 06/18

The source of tissue transmission factors used in the development of nuclear radiation casualty criteria from animal response experiments are documented. A byproduct of achieving this goal is the elimination of the many prevailing misunderstandings and misuses of the radiation related terms and quantities. The methodology and terminology used in calculating absorbed doses resulting from exposure to initial nuclear radiation are described. The tissue transmission factors used in developing initial nuclear radiation casualty criteria are calculated. Calculations of absorbed doses and the development of tissue transmission factors from those calculations are presented. GRA

N76-32842# Duke Univ., Durham, N.C. School of Engineering.

HEAT AND MASS TRANSFER IN THE HUMAN RESPIRATORY TRACT AT HYPERBARIC PRESSURES Final Report, 1 Apr. 1972 - 31 Dec. 1974

L. Sigfred Linderoth, Jr., E. A. Kuonen, M. L. Nuckols, and C. E. Johnson Nov. 1975 81 p refs

(Contract N00014-67-A-0251-0018; NR Proj. 201-148)

(AD-A021146) Avail: NTIS CSCL 06/19

The objective of the project was to mathematically model the heat loss process that occurs in the respiratory tract under deep ocean saturation diving conditions. This was approximated by determining the heat transfer characteristics of a branching scale model of the first two branches of the human lower respiratory tract. Heat transfer coefficients were obtained for a range of respiratory rates and respiratory gas mixtures for simulated ocean depths 0 to 1000 feet. These heat transfer coefficients were used to predict the heat loss from the respiratory tract of a diver by the successive application of the branching model, appropriately scaled, to simulate progressive units of the lung's anatomical configuration. GRA

N76-32843# Ohio State Univ., Columbus.

ROLE OF CARBON DIOXIDE IN INERT GAS NARCOSIS Annual Report, 1 May 1974 - 30 Apr. 1975

Harold S. Weiss and Lawrence W. Torley Dec. 1975 40 p refs

(Contract N00014-67-A-0232-0025)

(AD-A020984; OSURF-3916-A1) Avail: NTIS CSCL 06/19

The role of carbon dioxide and oxygen in high pressure narcosis was studied by exposing animals to hyperbaric conditions while maintaining them normoxic and normocapnic. Chickens were the experimental animals used. The unanaesthetized restrained birds were exposed to pressures up to 6 atmospheres absolute (ATA) in a hyperbaric chamber. Narcosis was estimated from changes in the visually evoked response (VER). The VER was recorded from the optic tectum by means of implanted

bipolar fine wire electrodes. The VER was initiated by an external strobe light. A depression of the amplitude of the VER is considered to reflect narcosis. All animals showed a strong depression in VER amplitude on exposure to normoxic, normocapnic gas at 6 ATA when the inert component was nitrogen. No depression of VER was seen when the inert diluent was helium. Increasing lung PCO2 to 70 mmHg had no effect on VER. Relatively small changes in the body temperature (1.5 C) depressed VER and may explain some of the depression of VER seen by others with helium. Resistance to the high flow of gas through the bird was usually 7.5-10 cm H2O at a flow rate of 6 L/min ambient temperature and pressure; this resistance remains nearly constant over the 1-6 ATA pressure range investigated. GRA

N76-32844# School of Aerospace Medicine, Brooks AFB, Tex.
CORNEAL CURVATURE CHANGES DUE TO EXPOSURE TO A CARBON DIOXIDE LASER: A PRELIMINARY REPORT Preliminary Report, Mar. 1974 - Mar. 1975
James T. Gallagher Dec. 1975 17 p refs
(AF Proj. 6301)
(AD-A020987; SAM-TR-75-44) Avail: NTIS CSCL 06/18

A preliminary study indicates the need for a more rigorous investigation to determine the relationship between the infrared exposure required to produce curvature changes and that required to produce visible damage to the cornea. GRA

N76-32845# Human Engineering Labs., Aberdeen Proving Ground, Md.
A HUMAN FACTORS ENGINEERING COMPATIBILITY ASSESSMENT OF THE DH-132 HELMET, COMBAT VEHICLE CREWMAN (CVC)
Nonnie F. Dickinson, Charles W. Houff, and Chester L. Woodward Dec. 1975 67 p refs
(AD-A020150) Avail: NTIS CSCL 06/17

The assessment of the DH-132 Helmet, conducted in November 1972, investigated the compatibility and interface of the DH-132 Helmet System with associated equipment, as a component of a protective system and as an individual helmet. This report explains in general terms and pictorially demonstrates those areas of concern that have not been sufficiently addressed in the design of an individual helmet system or its interfacing with its associated equipment. GRA

N76-32846*# Hamilton Standard, Windsor Locks, Conn.
ELECTROCHEMICAL PERFORMANCE INVESTIGATIONS ON THE HYDROGEN DEPOLARIZED CO2 CONCENTRATOR
John R. Aylward Jul. 1976 41 p refs
(Contract NAS9-13679)
(NASA-CR-147871; SVHSER-7090) Avail: NTIS HC $4.00 CSCL 06K

An extensive investigation of anode and cathode polarization in complete cells and half cells was conducted to determine the factors affecting HDC electrode polarization and the nature of this polarization. Matrix-electrolyte-electrode interactions and cell electrolyte composition were also investigated. The electrodes were found to have normal performance capabilities. The HDC anode polarization characteristics were correlated with a theoretical kinetic analysis; and, except for some quantitative details, a rather complete understanding of the causes for HDC electrode polarization was formulated. One of the important finding resulting from the kinetic analysis was that platinum appears to catalyze the decomposition of carbonic acid to carbon dioxide and water. It was concluded that the abnormal voltage performance of the One Man ARS HDC cells was caused by insufficient cell electrolyte volume under normal operating conditions due to deficiencies in the reservoir to cell interfacing. Author

N76-32847# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
STATIC PROPENSITY OF AIR FORCE UTILITY GARMENTS AND THE N-3B MODIFIED JACKET Final Report, Feb. - Aug. 1975
Preston C. Opt and Jack H. Ross Oct. 1975 31 p
(AF Proj. 7320)
(AD-A020957; AFML-TR-75-173) Avail: NTIS CSCL 06/17

This report describes and gives results of tests performed to measure the static propensity of the Air Force regular issue cotton utility uniform, a proposed polyester/cotton utility uniform, and the N-3B modified flying jacket. Static potential (voltage) was measured on the test subject after rubbing contact and separation of various garments. Tests were conducted in an environmental chamber at 70 F - 20% RH; 90 F - 20% RH; 70 F - 55% RH; and 15 F with resulting humidity. On the basis of the tests conducted and on analysis of the results, the proposed polyester/cotton utility uniform and the N-3B modified flying jacket present no greater hazard in the generation of static electricity than the 100% cotton utility uniform now in service. Author (GRA)

N76-32848# Defence Research Establishment Ottawa (Ontario).
FIELD TRIAL OF AN EXPERIMENTAL COLD-WEATHER HEAD PROTECTOR
D. J. Hidson, S. H. H. Pang, and J. M. McAndless Dec. 1975 26 p refs
(AD-A020376; DREO-TN-75-27) Avail: NTIS CSCL 06/17

An experimental head-protection system, subjected to limited testing during the 1974 winter, was modified and field tested during Exercise Honky Tonk at Fort Churchill, Manitoba in January 1975. The modified headgear was found to provide complete protection against frostbite and to prevent spectacle frosting under extreme wind-chill conditions. Under milder conditions or during physical activity, the headgear was found to be too warm and spectacle frosting occurred. The modifications made to the headgear are discussed with respect to their effect on its performance. Recommendations are made for further modifications to correct problems encountered during the tests. GRA

N76-33127 National Research Council of Canada, Ottawa (Ontario). Division of Mechanical Engineering.
PSYCHOMOTOR TEST PERFORMANCE AND SLEEP PATTERNS OF AIRCREW FLYING TRANSMERIDIONAL ROUTES
Leslie Buck *In its* Quarterly Bull. of the Div. of Mech. Engr. and the Natl. Aeron. Estab. Jun. 1976 p 19-33 refs (For availability see N76-33125 23-99)

Pilots and flight attendants flying scheduled services between Vancouver and Tokyo and between Toronto and Rome were tested on a tracking task before and after flights in each direction. Flights were included in schedules involving both 24-hour and 7-day layovers at the overseas station. During these periods they recorded their sleep patterns. The data showed that the flight subjects made an immediate attempt to adapt their behavior to local time and that changes in their performance scores could be interpreted on that basis. It was concluded that behavioral circadian rhythms adapt rapidly to a new time zone. Author

N76-33835*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIOMEDICAL ULTRASONOSCOPE Patent Application
Robert D. Lee, inventor (to NASA) Filed 30 Sep. 1976 22 p
(NASA-Case-ARC-10994-1; US-Patent-Appl-SN-728369) Avail: NTIS HC $3.50 CSCL 06B

An instrument with a single ultrasonic transducer probe and a linear array of transducer probes permitting three operator modes is described. An 'A' and an 'M' mode scanner were combined with a 'C' mode scanner and a single receiver is used. The 'C' scanner mode enables two-dimensional cross sections of the viewed organ. Video-produced markers enable measurement of the dimensions of the heart. COS/MOS integrated logic circuit components are used to minimize power consumption and permit battery operation. NASA

N76-33836*# Kanner (Leo) Associates, Redwood City, Calif.
CONTROL STUDIES FOLLOWING A DIABETES SURVEY AMONG EMPLOYEES OF A LARGE CHEMICAL FIRM
H. F. Orth, E. Martin, H. Mattern, and F. H. Schmidt Washington

NASA Sep. 1976 16 p refs Transl. into ENGLISH from Deut. Med. Woch. Schr. (Stuttgart), v. 97, no. 27, 1972 p 1019-1023
(Contract NASw-2790)
(NASA-TT-F-17240) Avail: NTIS HC $3.50 CSCL 06P

Glucose content in a morning specimen of urine after intake of 50 g glucose the previous evening was measured in 33,356 employees of a large chemical firm. Later, the results of this screening were checked by performing oral glucose tolerance tests (50 g glucose) on subjects chosen at random. Based on the results of the latter test, the initial screening detected only about 1/3 of the previously undiscovered diabetics. Author

N76-33837*# Scientific Translation Service, Santa Barbara, Calif.
CAN AZURE B-EOSIN REPLACE THE MAY-GRUENWALD-GIEMSA STAIN?
Dietrich Wittekind, Vera Kretschmer, and Walter Loehr Washington NASA Oct. 1976 15 p refs Transl. into ENGLISH from Blut (Munich), v. 32, 1976 p 71-78
(Contract NASw-2791)
(NASA-TT-F-17260) Avail: NTIS HC $3.50 CSCL 06A

A new method is described for staining blood and bone marrow smears. It is characterized by the presence of only two dyes, purified Azure B and Eosin in methanol, as stock solutions. Staining results are equivalent to those obtained by using traditional dye mixtures. Unlike these, Azure B-Eosin staining can be standardized and is easier to handle. Correlations between the Azure B-Eosin and May-Gruenwald-Giemsa staining methods are briefly discussed. Author

N76-33838*# Harvard Medical School, Boston, Mass.
CONTROL MECHANISMS OF CIRCADIAN RHYTHMS IN BODY COMPOSITION: IMPLICATIONS FOR MANNED SPACEFLIGHT Final Report
Martin C. Moore-Ede 30 Sep. 1976 136 p refs
(Contract NAS9-14249)
(NASA-CR-151003) Avail: NTIS HC $6.00 CSCL 06P

The mechanisms underlying the internal synchronization of the circadian variations in electrolyte content in body compartments were investigated, and the significance of these oscillations for manned spaceflight were examined. The experiments were performed with a chair-acclimatized squirrel monkey system, in which the animal sits in a chair, restrained only around the waist. The following information was given: (1) experimental methodology description, (2) summary of results obtained during the first contract year, and (3) discussion of the research performed during the second contract year. This included the following topics: physiological mechanisms promoting normal circadian internal synchronization, factors precipitating internal desynchronization, pathophysiological consequences of internal desynchronization of particular relevance to spaceflight, and validation of a chair-acclimatized system. Y.J.A.

N76-33839# Connecticut Univ., Farmington. School of Medicine.
TOXICOLOGY AND METABOLISM OF NICKEL COMPOUNDS Progress Report, 1 Dec. 1974 - 30 Nov. 1975
F. W. Sunderman, Jr. 15 Aug. 1975 32 p refs
(Contract E(11-1)-3140)
(COO-3140-34) Avail: NTIS HC $5.00

The toxicology and metabolism of nickel compounds were investigated in rats and hamsters. The knowledge has included: demonstration that hyperglucagonemia is primarily responsible for the acute hyperglycemic effect of parenteral Ni(II) in rats; demonstration that parenteral injection of Ni(II) in rats produces acute nephropathy with proteinuria and amino aciduria, and with ultrastructural lesions of renal glomeruli and tubules; confirmation of the inhibitory effect of manganese upon the carcinogenicity of Ni3S2 after intramuscular injection in rats, and elucidation of the effects of manganese upon the rates of excretion of nickel, and upon the acute histological reactions produced by Ni3S2; discovery that the antidotal efficacy of triethylenetetramine in acute Ni(II) poisoning in rats is substantially greater than that of other chelating agents. Author (ERA)

N76-33840# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
TOXIC POINT DETERMINATION OF SELECTED HAZARDOUS MATERIALS Final Report, Sep. - Nov. 1975
Richard A. Davis, Ralph N. Terpolilli, and Kenneth C. Back Dec. 1975 12 p refs
(Contract DOT-AS-40079-2)
(PB-250450/4; DOT-MTB-OHMO-75-4) Avail: NTIS HC $3.50 CSCL 06T

Toxic point is a term under consideration by the United Nations group of rapporteurs on the packaging of dangerous goods. It is defined as the temperature at which the equilibrium concentration of vapor of a substance measured at 760 millimeters is equal to the LC50 of the substance. This is also referred to as the temperature threshold of toxicity. The report contains the toxic points calculated for 57 substances. The calculations are shown together with the toxicity and vapor pressure data used therein. GRA

N76-33841# National Bureau of Standards, Washington, D.C.
MEASUREMENTS AND OBSERVATIONS OF THE TOXICOLOGICAL HAZARD OF FIRE IN A METRORAIL INTERIOR MOCK-UP Final Report
M. Paabo, B. Pitt (Johns Hopkins Univ., Baltimore), M. M. Birky, A. W. Coats, and S. E. Alderson Feb. 1976 20 p refs
(PB-250768/9; NBSIR-75-966) Avail: NTIS HC $3.50 CSCL 06T

Oxygen depletion, carbon monoxide, carbon dioxide, hydrogen chloride and hydrogen cyanide were selected for measurement and identification in Metrorail fire tests. Male rats exposed to the combustion products were examined for changes in blood chemistry, gross pathology and loss of function. Hydrogen cyanide and carbon monoxide levels in blood were evaluated and functional changes were noted. GRA

N76-33842# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.
A REVIEW OF BIOLOGICAL EFFECTS AND POTENTIAL RISKS ASSOCIATED WITH ULTRAVIOLET RADIATION AS USED IN DENTISTRY
Loren F. Mills, C. David Lytle, F. Allen Andersen, Kiki B. Hellman, and Larry E. Bockstahler Oct. 1975 41 p refs
(PB-254273/6; FDA/BRH-76/40; DHEW/PUBL/FDA-76/8021) Avail: NTIS HC $4.00 CSCL 06R

Dental procedures which utilize ultraviolet radiation are briefly described. The bases for UV safety standards are reviewed. The effects of UV exposure to the skin and eyes and how these effects may relate to oral mucosa exposure are considered. Potential modes of action by UV radiation on oral tissues as suggested by cell culture studies are summarized, and potential risks from UV exposure of individuals which might result from the dental procedures are discussed. GRA

N76-33843# National Bureau of Standards, Washington, D.C.
A NEW LOOK AT THE RESEARCH BASIS FOR LIGHTING LEVEL RECOMMENDATIONS Building Sciences Series, Final Report
Gary T. Yonemura and Yoshimi Kohayakawa Mar. 1976 14 p refs
(PB-253112/7; NBS-BSS-82; LC-76-136) Avail: NTIS HC $3.50 CSCL 13A

The validity of using threshold studies as the basis for lighting level recommendations is questioned. The performance of the eye at suprathreshold levels was investigated with sine- and square-wave gratings. The results of the study indicate that the behavior of the eye is significantly different at suprathreshold levels as opposed to threshold levels. For threshold studies, when contrast is plotted against luminance, the function is a monotonically decreasing function. At suprathreshold levels the function indicates the existence of a definite minimum, luminances greater or less requiring more contrast to appear subjectively equal. GRA

N76-33844# National Aeronautical Lab., Bangalore (India).
ON SIMULATION AND EVALUATION OF AIRCRAFT HANDLING QUALITIES
Rajendra K. Bera Jan. 1976 23 p refs
(NAL-TN-49) Avail: NTIS HC $3.50

Some problems connected with flight simulation and selection of evaluation pilots are discussed. A modified Cooper-Harper scale is suggested which provides separate ratings on the aircraft's longitudinal, and lateral/directional dynamics, and on cockpit management. The ratings were qualified by an alphabetic index which indicates the confidence with which simulation data may be extrapolated to actual flight situations. Author

N76-33845*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
NASA AVIATION SAFETY REPORTING SYSTEM Quarterly Report, 15 Apr. - 14 Jul. 1976
Charles E. Billings, John K. Lauber, Hallie Funkhouser, E. Gene Lyman, and Edward M. Huff Washington Sep. 1976 23 p
(NASA-TM-X-3445; A-6743; QR-76-1) Avail: NTIS HC $3.50 CSCL 05B

The origins and development of the NASA Aviation Safety Reporting System (ASRS) are briefly reviewed. The results of the first quarter's activity are summarized and discussed. Examples are given of bulletins describing potential air safety hazards, and the disposition of these bulletins. During the first quarter of operation, the ASRS received 1464 reports; 1407 provided data relevant to air safety. All reports are being processed for entry into the ASRS data base. During the reporting period, 130 alert bulletins describing possible problems in the aviation system were generated and disseminated. Responses were received from FAA and others regarding 108 of the alert bulletins. Action was being taken with respect to 70 of the 108 responses received. Further studies are planned of a number of areas, including human factors problems related to automation of the ground and airborne portions of the national aviation system. Author

N76-33846*# California Univ., Berkeley.
SECONDARY TASK FOR FULL FLIGHT SIMULATION INCORPORATING TASKS THAT COMMONLY CAUSE PILOT ERROR: TIME ESTIMATION Final Technical Report, 1 Nov. 1974 - 31 Oct. 1975
Eleanor Rosch 31 Oct. 1975 32 p refs
(Contract NCA2-OR-050-503)
(NASA-TM-X-74153) Avail: NTIS HC $4.00 CSCL 05E

The task of time estimation, an activity occasionally performed by pilots during actual flight, was investigated with the objective of providing human factors investigators with an unobtrusive and minimally loading additional task that is sensitive to differences in flying conditions and flight instrumentation associated with the main task of piloting an aircraft simulator. Previous research indicated that the duration and consistency of time estimates is associated with the cognitive, perceptual, and motor loads imposed by concurrent simple tasks. The relationships between the length and variability of time estimates and concurrent task variables under a more complex situation involving simulated flight were clarified. The wrap-around effect with respect to baseline duration, a consequence of mode switching at intermediate levels of concurrent task distraction, should contribute substantially to estimate variability and have a complex effect on the shape of the resulting distribution of estimates. Author

N76-33847# Auburn Univ., Ala. School of Engineering.
COMPUTER MODELING OF THE BODY-HEAD-HELMET SYSTEM, VOLUME 1 Final Report
Wartan A. Jemian and Nan-Heng Lin Feb. 1976 96 p refs
(Contract DABT01-74-C-0231)
(AD-A023785; USAARL-76-13-Vol-1) Avail: NTIS CSCL 06/17

Three dimensional finite element methods of analysis were applied to the body-head-helmet structural system under conditions of static equilibrium and to the head-helmet assembly in a dynamic mode. Computer programs were written to generate the three dimensional grids, to evaluate inertial properties, and to process and display results of the structural analyses. Static analysis, using a fixed configuration, is applicable to the description of displacement and stress component fields in the system. The results of this mode of analysis have the potential of yielding information related to loss of consciousness due to impact situations. Dynamic structural analysis was performed on a computer generated pseudospherical model simulating the drop test. Results provide time traces of the displacement, velocity, acceleration, and stress components at selected nodal points and elements of the system. Methods were demonstrated for the determination of a number of parameters of potential or proven value in evaluating crash protection or crash severity. These include linear acceleration profile, rotational acceleration profile, shear stress, skull deflection, severity index, mass moments of inertia, and regional centers of gravity. Six specific recommendations were made for steps to be taken in applying finite element simulation to helmet design. GRA

N76-33848# Auburn Univ., Ala. School of Engineering.
COMPUTER MODELING OF THE BODY-HEAD-HELMET SYSTEM. VOLUME 2: FINITE ELEMENT COORDINATES AND COMPUTER PROGRAM SUBROUTINES FOR A BODY-HEAD-HELMET SYSTEM Final Report
Wartan A. Jemian and Nan-Heng Lin Feb. 1976 77 p refs
(Contract DABT01-74-C-0231)
(AD-A023786; USAARL-76-13-Vol-2) Avail: NTIS CSCL 06/17

The report is a supplement to the basic report entitled, Computer Modeling of the Body-Head-Helmet System'. As such, it should be used with the basic report for maximum clarity. Nodal point coordinates and boundary conditions for a fixed Body-Head-Helmet configuration are listed. A 3X3X3 pseudo sphere head-helmet configuration is also listed. A listing of service in FORTRAN calls on the facilities and subprograms of the IBM operating system and the Calcomp Plotter. The service listed should perform all of the operations referred to in the basic report. GRA

N76-33849# Braddock, Dunn and McDonald, Inc., El Paso, Tex.
SEEKVAL PROJECT IAI: EFFECTS OF TARGET NUMBER AND CLUTTER ON DYNAMIC TARGET ACQUISITION Final Report
Robert L. Hilgendorf and John Milenski Wright-Patterson AFB, Ohio AMRL Jan. 1976 92 p refs
(Contract F33615-73-C-4106; AF Proj. 7184)
(AD-A024166; AMRL-TR-74-4) Avail: NTIS CSCL 17/8

This report describes an experiment conducted to obtain data for use in determining the effects of a number of targets and background clutter elements on visual target detection performance by means of the unaided eye. Data obtained from this experiment consist mainly of whether or not single or groups of tank targets within controlled clutter (defined as tree density) configurations were detected, and the times of detection. Statistical methods, including analysis of variance tests and Newman-Keuls tests, are employed to assess the effects of target and clutter factors on detection performance. For this experiment, the effects of number of targets were determined to be more important than those of clutter on detection performance, and there were no significant effects due to interaction between targets and clutter elements. Author (GRA)

N76-33850# Bureau of Mines, Pittsburgh, Pa. Mining and Safety Research Center.
AN ICE-COOLING GARMENT FOR MINE RESCUE TEAMS
Maria I. DeRosa and Richard L. Stein May 1976 19 p refs
(PB-254487/2; BM-RI-8139) Avail: NTIS HC $3.50 CSCL 06Q

High temperatures encountered by mine rescue teams during emergency situations may cause severe physiological strain, hindering the men from carrying out rescue and recovery missions. A prototype ice cooling garment (ICG) has been developed to alleviate physiological strain due to heat stress. The effectiveness of the garment was tested with acclimatized and unacclimatized subjects at a typical work rate expected during rescue operations and at various hot environments. Both heart rate and skin temperature values were lower while wearing the ICG. GRA

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